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THE IRON TRADE REVIEW

VOLUME XXIII. CLEVELAND, O., SEPTEMBER 25, 1890. NUMBER 39.

THE IRON TRADE REVIEW.

A JOURNAL OF THE
IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS
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CLEVELAND, O., SEPTEMBER 25, 1890.

THE WEEK IN IRON CIRCLES.

General Features.

The prominent feature at present is the large amount of activity found among all melters of iron. The car works, machine shops and foundries nearly all report heavy orders on hand, and in some cases more business offered than can be handled. It may be said truthfully, we think, from a general survey of the situation, that there is not an idle puddling furnace in the country and the foundries were never so active. Consumption is for the moment in excess of production. Business in general throughout the metal interests is in a healthy condition and with the equilibrium of the money market restored a prosperous Fall trade seems assured. Consumers all report an extraordinary demand for finished product, many of them refusing to receive further orders on account of lack of capacity to fill same. One large Western manufacturer has just completed arrangements whereby several thousand tons will be puddled for him at three different points in the South, and all mills so far as we can learn are running with a full force night and day, and the outlook for the iron interests is certainly encouraging. The makers of iron South are well satisfied with the condition of the market and are very firm in their prices. Shipments from the furnaces are quite heavy, stocks of iron are decreasing, and having made sales of a portion of their output for delivery extending into the coming year as late as March, there is no pressure to crowd sales. The market at Cincinnati has been somewhat unsteady during the week; Northern mill irons and Bessemer have shown some signs of weakness. But it is believed to be temporary. The market for Southern irons has been vibrating between two influences. Some furnaces which are largely sold up contemplate advancing prices this week. Other furnaces not so liberally sold ahead were willing to sell at figures prevailing the past fortnight, and if necessary shade a trifle for large orders, hence no advance has been realized; but it seems imminent, as Southern furnace order books are well filled generally, and the demand continues very heavy. There has been a fair aggregate of business transacted during the week at St. Louis, principally in small and medium lots of Southern coke iron at substantial concessions from quoted prices; and strangely enough these cuts have affected precisely those grades which are scarcest at the furnaces. The situation is abnormal. In car-wheel irons there is little doing; whilst Ohio softeners are in usual demand at unchanged values. The scarcity of cars at Connellsville still continues, and coke shipments to the St. Louis district are so reduced as to cause considerable inconvenience. At Detroit Southern foundry and forge and Bessemer iron must be reported weak. While August showed a diminution of coke iron on hand, the amount was too small to have any decided beneficial effect. That this is fact is shown by the falling off in figures in nearly every quoted market. That bottom cost figures have been reached is to a certain extent believed, and it is hoped that large general trading will relieve the furnacemen in the near future. There have been booked some fairly round lots of Lake Superior charcoal at full market rates. The surplus of this grade is so small that sellers are very sensitive, and the market is generally strong, though an occasional weak spot can be picked out. This is the exception, however. Finished material is decidedly stronger, some advances having been made on special lots, while generally, few mills can be found willing to shade quotations for large orders. At Chicago the market continues quiet, and the amount of buying during the past week has not been large. Some fair sized blocks of Southern coke iron, however, have been placed. Silvery irons and softeners are in good demand, while Lake Superior charcoals are inactive. Some slight concessions have been offered by certain Southern coke furnaces for early deliveries, but all of the companies in the Chicago district are firm on business for scattered deliveries. There has been a noticeable increase in sales at Buffalo during the past week, and the outlook at the present time is quite promising for a brisk trade during the coming season. While the market at Pittsburgh for most kinds of manufactured iron is strong and active, there has yet been no perceptible improvement in the situation as regards pig iron. It is thought, however, that the recent advance in pig iron abroad and the large consumption now going on at hand will soon have a perceptible effect on prices.

Iron Ore.

In the absence of any and all transactions, the market affords little by way of interest save small talk of minor importance, and mild speculation as to how much one mine will beat the other in the year's production. Among the ore men there is a well settled opinion that some of the mines have been oversold, but no one will become authority for a statement of this character; still, where there is so much smoke, there is liable to be some fire, and it is not at all unlikely that a considerable deficiency will be shown in the case of some mines that were either crippled by labor troubles, or the output was overestimated by their too sanguine representatives. Even at this time it is not difficult to pick out half a dozen mines that will not nearly come up to the owners' expectations. There has been a slight improvement during the week in the ore receipts, owing to the favorable weather at the upper lake ports, and shippers feel a little more encouraged. Vessel rates remain unchanged, and the demand for bottoms is light. It is thought, however, that the movement of grain, in this direction, is apt to have some effect on the carrying rate of ore within a short time. No change is reported in the coke situation, the producers still insisting on their old and exorbitant price of $2.15 at the ovens.

Pig Iron.

While the ore men are taking things easy after a busy as well as profitable season, there is not such a disgusted lot of people in all the universe than can be found, now-a-days, among the manufacturers of pig iron. They are within sight of the promised land, as it were, yet cannot get in. All around them they witness the signs of a boom among the consumers of pig, yet they themselves have only hard times to record. The present state of the market is indeed an anomaly. All the products of pig iron are advancing, but everybody seems to be pounding the pig iron market. Whether it is over-production that is causing all this mischief, or under-consumption, is of very little concern to the furnacemen. The stocks of pig iron are decreasing, the consumption is increasing, but the price is low, and the volume of trade far from satisfactory. One manufacturer thinks that the furnacemen, in their constant improvements to their plants, have gradually, yet so quietly as almost to overlook the fact, doubled their capacity, so that the same plants are practically doing twice the work of ten years ago. The only good prospect left to the furnace interests is the silver lining that shimmers through the decrease of the visible pig stocks, and everybody is watching its disappearance with expectations of better times. Bessemers are very weak, and foundry is not much better, so that what little business is going on, is largely confined to mill iron.

Scrap Iron.

The scarcity of old American rails is still responsible for the extreme price asked, $28, and as there is only $2 difference between that and muck bar, the needs of mill men become more perceptible. Other old material is not nearly as strong, but the entire list is selling at the top of the market, with the exception of car wheels, which are dull.

IRON AND STEEL MAKING AT DULUTH.

The attention of iron-makers is being more and more drawn to Duluth as a favorable point for the manufacture of iron and steel and their various products. At first glance it would appear that, in some respects, a scarcely less promising point could be chosen—not because there is not a large and enterprising population as a basis of demand, nor an abundant supply of the richest ores in the world close at hand, but because we have grown to be accustomed to the manufacture of iron and steel at what appear to be the most convenient meeting-points of the coke, ore and limestone. Chicago, however, has demonstrated that she can haul the coke 525 miles, and still make steel more cheaply than Pittsburgh, and why cannot Duluth, especially since she is within a hundred miles or so of the Vermilion and Gogebic ranges, with their abundance of rich Bessemer ores? The first objection would naturally be, that she has no coke, and is 1,052 miles away from the nearest coke region. Furnace coke at Connellsville was quoted last week at $2.15 per ton of 2,000 pounds, f. o. b. cars. The freight from Connellsville to Duluth, we are informed, is $5.00 per ton, making the cost of the coke, laid down at the latter port, $7.15. It must be admitted that as compared with $2.85 at Pittsburgh, $3.50 in the Mahoning and Shenango valleys, $3.85 in Cleveland, $4.40 in Buffalo, $4.50 in Detroit, $4.80 in Cincinnati $4.90 in Chicago, $5.00 in Milwaukee, and $5.50 in St. Louis, the cost at Duluth does not make a very favorable showing; and so it would be if our Lake Superior neighbor had to buy Connellsville coke at the mines and ship it to Lake Superior. We are informed, however, that the situation will be very much improved by next Spring, when a large blast furnace will be put in operation at Duluth, in connection with coke ovens that will supply the necessary fuel, made from Connellsville coal, coked on the ground. With coal rates from Buffalo to Duluth averaging only 40 cents per ton, and often going as low as 25 cents, it is estimated that the coke made at Duluth will cost not to exceed $5.50, and possibly may reach as low a figure as $5.00. It must be admitted, therefore, that, with fuel at substantially Milwaukee prices and the ore much cheaper, Duluth has the prospect of developing quite an iron industry. A large rolling mill and steel plant is about to be removed from Newport, Ky., to Duluth, and some other large iron industries are in contemplation. Foundry pig now costs at Duluth from $18.00 to $20.00, according to quality and price in Eastern markets, and some foundry coke is made on the Wisconsin side which is sold at Duluth at $6.00. It is not given a good name, however, by foundry men, the probable reason being that all the best coke is sent to the smelters in Montana, and only the second best and smaller sizes are offered in the Duluth market. With coke ovens at their very doors, however, foundries, pipe works and machine shops will find themselves in much better position.

"HAVING EYES, THEY SEE NOT."

Anent the question of speculation in pig iron and the relation of storage warrants to the same, the Chattanooga *Tradesman* has this to say:

The *Tradesman* has not "changed front" on the morality or desirability of cornering the iron market. We regard it as nonsense to assume that pig iron warrant storage promotes speculation in the metal and its paper representative. The storage warrant system has no such motive necessarily. It has not, so far, either in this country or in England, specially fostered reckless speculation to the trade's hurt. The most disastrous speculation in pig iron this country was ever visited by was in 1880, when there were no storage yards, warrants or anything resembling either. It was only a worse nuisance and damage than the speculation of 1871-3. The *Tradesman* has not in the least modified its opinion that a storage system is a necessity and a great benefit to the trade. The fact that speculators *may be* facilitated in their mischief by such system does not at all prove it to be a bad thing. The best laws, devices and plans of men are used by bad men to compass bad ends. The Storage Warrant Company has greatly benefitted the weaker furnaces, and we have seen no evidence that it has been abused by speculators. The most damaging speculation in iron last Fall, Winter and Spring was in the Pittsburgh district, where, according to the *Review*, storage is out of favor, not practiced to any extent.

All this in return for *The Iron Trade Review's* well meant commendation of the *Tradesman's* recent utterances regarding the evils of speculation in the iron trade. So it appears that our Chattanooga contemporary still clings to the idea that the American Pig Iron Storage Warrant Company was organized for the sole benefit of the weaker furnaces and is as innocent and harmless as an angel of light respecting the deep and devious ways of the Wall street speculators. Surely it has read the literature of the new company with very little care if it has failed to discover that one of the primary objects of its organization is to *promote* speculation. The essentially bad thing about the system is, not that it may incidentally allow speculation, but that it has from the start been actively laying its plans to put pig iron in the speculative list along with wheat, oil and other commodities. That it has not as yet succeeded in cornering the surplus production is not its fault, though the fact itself is a strong comment on the good sense of the iron trade in general. Nor has our Chattanooga friend read his English exchanges with very great enlightenment if he has failed to discover that the entire attack upon pig iron speculation in that country is concentrated against the warrant system as the main cause of the evils from which the foreign markets have been suffering. Has the *Tradesman* never heard of the proposition, discussed in and out of Parliament, to entirely abolish the storage warrant system? Our opposition to the storage warrant system in this country is because we believe it to be wrong in motive, wrong in tendency, wrong in principle and wrong in practice; and we believe the great majority of iron men in the country are of like opinion.

THE FINANCIAL BENEFITS OF EXPOSITIONS.

That the direct results of a well-conducted exposition are not confined to dividends to stockholders is being practically demonstrated at Pittsburgh. The *Dispatch* has taken the pains to seek out a number of the leading business houses and ascertain the effect upon their trade during exposition week, and the showing is most significant. The crowds from outside the city all do more of less shopping, and that fact has caused quite a local business boom. Some of the leading merchants say their business has increased 25 to 50 per cent., and not a few say that the money contributed to the Exposition is the best paying investment they ever made. Not one of them would see the Exposition abandoned, even if they had to very largely increase their stock in it. Perhaps we cannot do better than quote the words of one of the most prominent and intelligent merchants in Pittsburgh. Said he:

The Exposition is of almost inestimable benefit to the merchants of Pittsburgh and to the city in general. This is usually a dull month. The city people have just returned from their Summer outings and are not ready for business. They do not commence their shopping until late in the month. The Exposition and the cheap excursions bring in people within a radius of 100 miles. They are good people and buy good goods. Almost all our sales this month are to people outside of the city. They are from towns like New Castle, West Newton, Greensburg, etc. They take just as fine a quality of goods as do the city people, and they are not hard to deal with. Last year our sales increased 20 per cent., and this year they will be advanced to 25 per cent. at least. There are more new faces, too, and we are getting a class of trade that would not be reached in any other way. Of course, there are many of them who would come at some other time of the year, and this brings them in earlier. It is an advantage to us. We can give better service now than we could when the city rush is on, so if we did not get any new people we would still be ahead.

The number of new customers is referred to as very gratifying, and the fact is emphasized that they come to buy, not simply to "shop." Even the weather does not appear to lessen the crowds of purchasers. As one merchant put it, the exposition is an educator; it teaches people how and what to buy. Often one person does the trading for a number of friends or neighbors.

We have referred simply to the benefits of the mercantile trade. Of course, the advantages extend alike to railroads, hotels, street car companies and to exhibitors generally. There is no doubt that, aside from the educational aspects, the financial results all around are direct and tangible. But all this depends on whether the exposition is worth seeing or not, and the whole question resolves itself into one of management. Cleveland needs an exposition, but it must be a well managed exposition, if at all.

THE TINPLATE SITUATION.

The Welsh tinplate makers are reported in a state of great excitement, as the result of a sudden rush for their product by American consumers, in anticipation of the passage of the McKinley bill.—[Iron Trade Review.

Had the *Review* used the word "dealers" instead of that of "consumers," its statement could be accepted as absolutely correct. The consumers will appear by and by and pay the dealers a big profit on what they have laid in. If "the foreigner pays the tax," we see no need of such haste on the part of patriotic American dealers to lay away big stocks. Should the Welsh, in view of this extraordinary call for goods, increase the price temporarily, it may be expected that that fact will be used to prove how wise is the law that proposes to hire some tinplate made at home. But whatever is done, the American consumer may prepare himself to work more time in order to get tin goods. The same will be true of most goods. The dealers will be highly pleased with the McKinley bill while their present stocks hold out. The consvmer will have no reason to smile. He pays it all.—[Cleveland Press.

What our Free Trade contemporary foreshadows as a possibility has actually come to pass. The Welsh tinplate makers, ever ready to take advantage of our weakness, have strongly advanced prices; and, were it not for the present financial stringency, they would doubtless screw them up to a still higher point. Out of a total of

480 mills in Wales, 459 are in operation, in the hope that this heavy production, or rather over-production, will be required on this side of the ocean sooner or later, at fabulously high prices. Of course the New York importers are are working into the hands of the Welsh manufacturers by buying large lots on speculation, so that the American consumer finds himself between two fires; but it will come out all right, and no thanks to the foreign manufacturers, or the New York speculators either. Substantially the same condition of things has taken place in every instance where we have broken away from dependence upon foreign supplies; but we have learned by this time that the only way to secure industrial independence is to foster home industries. And that is precisely what the McKinley bill proposes to accomplish.

IRON VS. STEEL.

The popular idea of steel is anything that is very "shiny," says *The Enneer*. Trimmings of ladies' dresses, buckles, etc., are called steel chiefly for this reason. What is, and what is not steel, is not known even to experts; they are unable to draw the line. Sir Henry Bessemer confesses his inability to do so in this article from the London *Engineer*:

"A correspondent mentions the fact that 'at Woolwich Arsenal, some years ago, wrought iron bars were melted in crucibles and cast into ingots—was the resulting metal cast steel or cast iron?' My reply is, that if no carbon was added to the wrought iron, the ingots produced by their simple fusion would be cast malleable iron; but if charcoal or a carbide of iron were put into the crucible, the carbon in either case would combine with the malleable iron and convert it into steel, in the manner frequently practiced in making crucible steel from bar iron in Sheffield. This simple fact absolutely and truly defines what is iron and what is steel, viz.: iron pure and simple results from the decarbonization of pig iron by any process whatever, and steel results from the intentional and measured recarbonization of such malleable iron, the quantity of carbon so added in each case being regulated by the quality of the steel required.

"All attempts to define what is steel and what is iron by the temper or hardening test must fail, because the hardening depends on so many conditions. Steel which will not harden if plunged at a certain temperature into water of the mean heat of the atmosphere, will harden in an acid liquor icy cold, and steel which will not harden under these conditions may be hardened in mercury. Much also depends on the temperature of the steel before immersion; and when all these facts are considered, how are we to ascertain how much, or how little, the hardening process has actually taken place? In fact, it is all a question of degree, and no definite or bounding line exists whereby we can determine what is steel and what is not steel by the hardening test.

"If we find this great difficulty in defining what is cast steel, how much more difficult shall we not find the task of defining what is crucible steel? In Huntsman's time, and long after it, crucible steel was made, of most excellent quality, by the fusion of blister steel produced from high-class Swedish iron bars; but when we find in our own time that thousands of tons of Bessemer steel rail-ends are remelted in crucibles, it is interesting to know what to call the resulting ingot. Is it a veritable crucible steel? Is it cast steel? Or is it Bessemer steel in disguise?

English Iron Industry.

The English Iron Trade Employers' Association does not take an entirely rosy view of iron and steel industries. According to the report:

In the matter of trade the past few months has seen the commencement of a reaction in the iron and engineering industries, the end of which does not seem to have been reached. The fall in the value of material has gone side by side with a limitation of orders for work in the steamship yards and engine shops of the country, and the increased activity which was hoped for on all hands has not been reached by employers, who were looking for such an improvement as would have satisfied them in declaring trade good and fairly profitable. Taking a general survey of the trade for the official year, it must be reluctantly declared that it has not been a profitable one to engineers, as the sudden increase in the volume of work produced, by no means ministered to their profits. The rising prices of material, and the immediate and often extravagant demands made by workmen for increased wages, rates and diminished hours of labor, have told greatly against the enterprise of the country by the disheartening effect they have had upon those whose capital was necessary for maintaining their national prosperity with special reference to the industries in which their members were engaged. Taking the leading districts where the association has members, the upward tendency of wages might be taken at from 10 to 15 or even 20 per cent. There was, however, every prospect that rates had reached their highest point, as trade was on all hands admitted to be falling off; and in the shipbuilding industry its relaxing activity was so distinctly marked as to have a very direct effect upon nearly every other branch of the iron and engineering trades of this country.

Material for Locomotive Crank Pins.

The *Northwestern Railroader* recently sent out a circular asking for expressions of opinion as to the best material for locomotive crank pins. Answers were received from one hundred and twenty members of the Master Mechanics' and Master Car Builders' Association—being a larger expression of opinion than is ever obtainable at the annual convention of either associations. Among those who replied were a majority of the best known heads of mechanical departments in the country. On the subject of locomotive crank pins, opinion was fairly equally divided between iron and steel, with an advantage in favor of the latter of forty-four votes to thirty-four.

IRON FROM THE ORE BY THE DIRECT PROCESS.

Experiments have been in progress for some time past in the establishment of Park Bros., which are of much interest in the iron world. These are in connection with the extraction of iron from the ore by the direct process, invented by Adams, and under the patents held by Messrs. Blair, of this city. The process is also under trial by the Premier Steel Co., of Indianapolis. Several tons of steel made from blooms reduced by the process have been turned over at the latter's works, but neither there nor here, as yet, have the experiments sufficiently developed to permit of calculations as to the actual value of the method. Mr. T. S. Blair, who is superintending the reduction in Park Bros.', said yesterday, that he was not yet prepared to speak authoritatively, or officially, as to the result so far as obtained, but hoped to do so in a few days.

That iron could be successfully—from a commercial point of view—obtained from the ore has been discredited and decried by metallurgists, and even in the light of results so far obtained from actual test, there are not many who will even now concede the process as at all practicable.

Reference has been made in a former issue of the *Dispatch* to the operations of the Carbon Iron Works in this direction, and it was said at the time that further experiments and trials of the process would be necessary, and never be made, before public attention would be invited to the results. At neither works are the trials so far advanced as to make this publicity as yet desirable, but by the end of the year it is expected that the results from the direct process will be such as to create something like a revolution in the iron trade. So, any way, its adherents maintain.

The direct process, it is held, to become commercially successful, must have certain peculiarities. The metallic iron in the ore must be completely reduced from its surroundings to the condition of a metallic sponge. The metallic iron in the ore must not be wasted. For every unit of iron in the ore there must be produced an unit of metallic iron in the sponge. The process must occupy the minimum of time, and must be inexpensive in its charges. The conditions of heat in the furnace must be such as to obviate any risk of the ore becoming reoxidized, or of the furnace bunging up. In relation to the first of these necessities, that of the metal in the ore being completely reduced from its surroundings, recent experiments in electrically concentrating metallic iron, made in this city, and proved to be successful, must have an important effect.

The experiments alluded to showed very clearly the possibility of obtaining pure concentrates from the ore at a very low cost. When this system is placed in operation on an extensive scale, as it will, in time, it will result in a two-fold economy; on the metallic iron delivered at the furnaces from the cheaper cost of transportation, and in the saving effected by the iron being already freed from its foreign surroundings, and so being more easily reduced under the direct process. Both trials being brought to a head at the same time will enable definite data as to the real value of the direct process system being obtained.

One of the difficulties hitherto in the way of a direct process being commercially successful is stated to be an incomplete reduction of the ore without excessive waste. This applies as well to processes where the gas has been passed through the body of the ore, and to the retort and open-hearth process, either with or without canister. Such an effect would result in making, not a sponge, but a mixture of sponge, of half reduced ore, and ore in its natural state merely heated. Another difficulty stated to exist arises from the fact that where most direct processes are continued for a time sufficiently long to effect a complete reduction of the ore, the expense is so great as to render it of no use commercially. So far as has been shown from results up to the time when the recent tests were made, the length of time necessary for reducing the ore has been so great, and the yield from each furnace so small, that a plant to produce a fair amount of material would require to be as extensive as it would be expensive.

The construction of the Adams process furnace bears a resemblance to a small blast furnace, with regenerative checker-work on the sides. The ore under treatment is thoroughly and constantly under the influence of the gas, the reduction being performed in a wonderfully short space of time in a thorough manner, at a low cost and with no loss of iron. The sponge is used in connection with the open-hearth process, practically taking the place of so much iron or blooms. The process shows some important results in the elimination of phosphorus, especially in low phosphorus ores and iron. The results in some cases have been even better than with the basic process.

The gentlemen in this city interested in the process have very nearly perfected their tests, and some very interesting facts in connection with it may be expected very shortly. Metallurgists, who, up to this, have doubted the practicability of the process, are no longer so firm in their antagonisms. They are inclined to believe that there may be something in it. There is even reason to believe that there is; and a very large something, too.—[Pittsburgh Dispatch.

Free Mining Machinery.

Certain manufacturers of mining machinery are advertising that their goods are now admitted into Canada free of customs duties. This statement needs qualification. The item bearing on the subject reads:

"Mining machinery, when imported within three years after the passing of this Act, which is at the time of its importation of a class or kind not manufactured in Canada * * (free)."

Each importation of mining machinery has, therefore, to be dealt with on its merits. Since the change in the duty on this class of machinery, several applications have been received at the department for refunds of duties paid on mining machinery imported before March last, but the department has invariably refused these applications. The latest refusal applied to the Hussey-Vivian Co., which is mining nickel-copper at Sudbury.—[Hardware, Toronto.

BOILER FRONTS.

Boiler fronts are made in many different styles, almost every maker having some peculiar points in design that he uses on his own boilers, and which nobody else uses. However, if we leave out the water fronts and the various

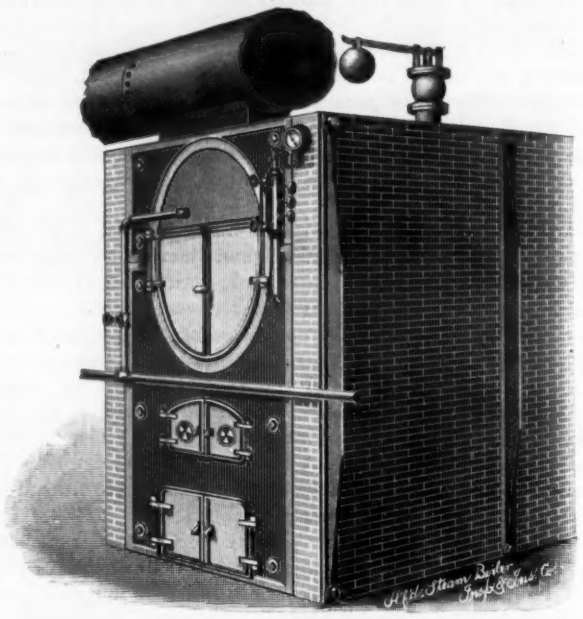


FIG. 1.—A FLUSH FRONT.

patented fronts, we may classify all those that are used on horizontal tubular boilers under the four heads—(1) flush, (2) overhanging, (3) cut-away, and (4) fronts with breeching.

Fig. 1 is a perspective view of a flush front, and Fig. 2 is a sectional view

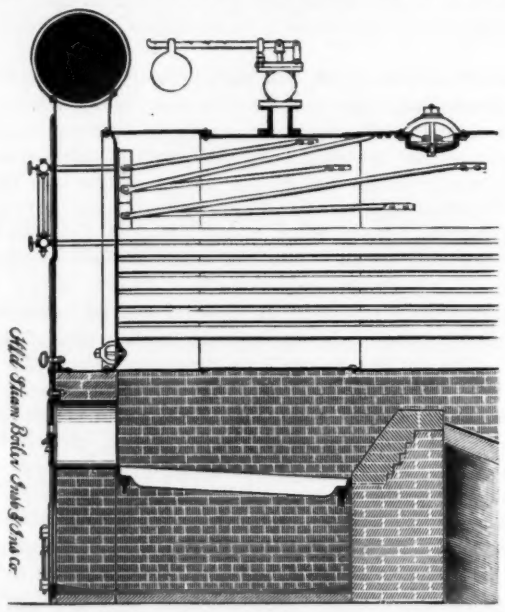


FIG 2.—SECTIONAL VIEW OF FLUSH FRONT.

of the setting. This was one of the earliest forms of fronts, and though it often gives good satisfaction, yet it is liable to certain accidents that will be

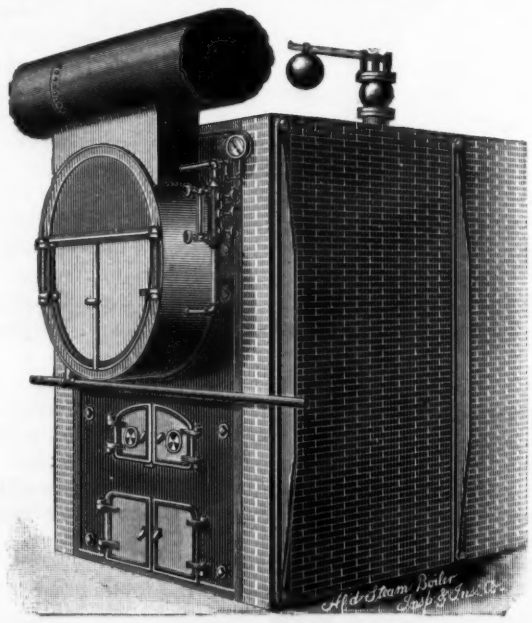


FIG. 3.—AN OVERHANGING FRONT.

presently explained, and we always recommend one or other of the three other styles.

As will be seen from the cuts, the front of the smoke arch, in this form of setting, is flush with the front of the brickwork, and the dry sheet just outside of the front head is built into the brickwork. The heat from the fire, striking through the brickwork, impinges on this sheet, which is unprotected by water

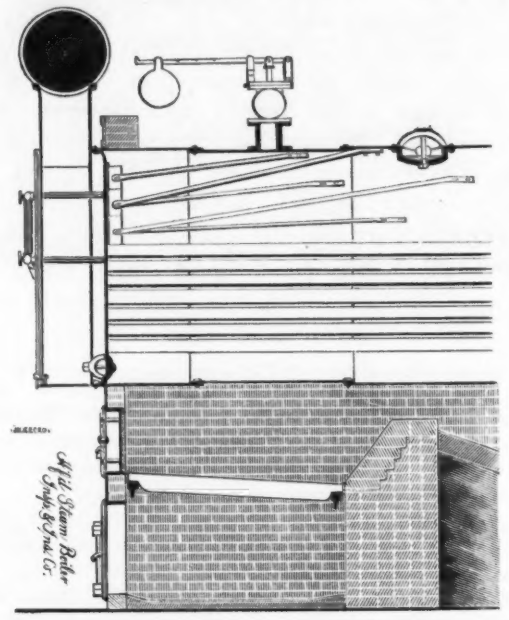


FIG. 4.—SECTIONAL VIEW OF OVERHANGING FRONT.

on the inside. So long as the furnace walls are in proper condition the heat thus transmitted should not be sufficient to give trouble; but after running some time, the bricks are very apt to fall away from over the fire door, and thus expose portions of the dry sheet to the direct action of the fire, causing

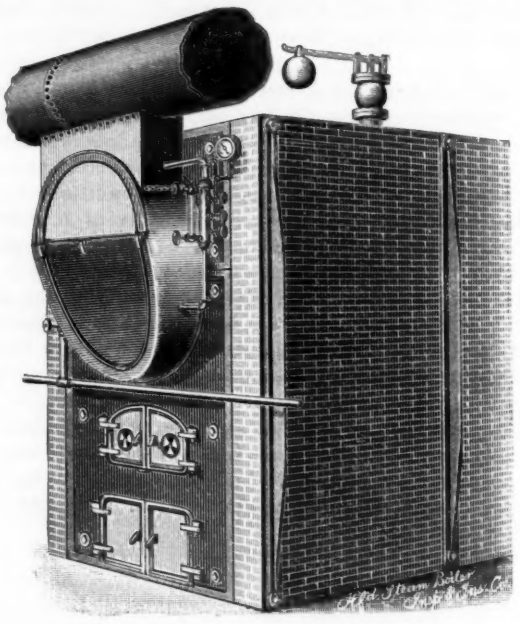


FIG. 5.—A CUT-AWAY ENGINE.

it to be burned or otherwise injured by the heat, and perhaps starting a leakage around the front row of rivets, where the head is attached to the shell.

In the overhanging front, shown in perspective in Fig. 3, and in section in Fig. 4, this tendency is entirely prevented by setting the boiler in such a

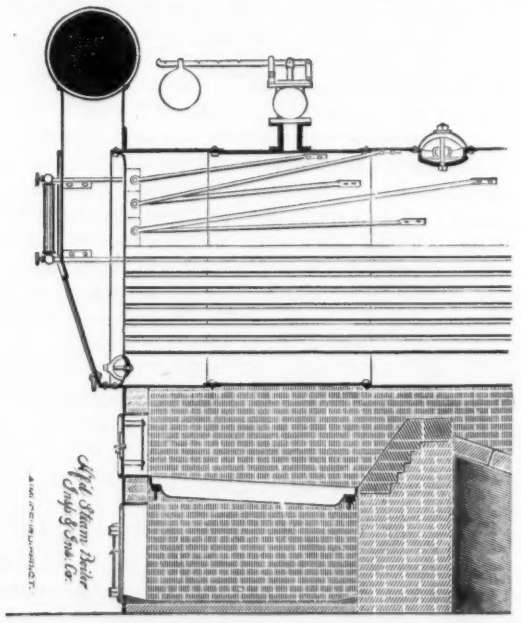


FIG. 6.—SECTIONAL VIEW OF A CUT-AWAY FRONT.

manner that the dry sheet projects out into the boiler room. If the brickwork over the fire-door falls away when a boiler is set in this manner, the only effect is to slightly increase the heating surface. No damage can be done,

since the sheet against which the heat would strike is protected by water on the inside.

The objection is sometimes raised against the projecting front, that it is in the way of the fireman. To meet this point and yet preserve all the advantages of this kind of front, the cut-away style has come into use. It is shown in perspective and in section in Figs. 5 and 6, respectively. In this form the lower portion of the front sheet is cut obliquely away, so that at the lowest point the boiler projects but little beyond the brickwork. Although this style of front may have some advantages in the way of convenience, it has a serious disadvantage that should be well considered. It will be noticed that in the flush and overhanging fronts the doors open sidewise, swinging about vertical hinges. This is not always the case, as sometimes, and particularly in old boilers, the hinge is horizontal and the door swings upward. However, there is no reason why the hinges should not be placed vertically on these fronts. On the other hand, when the doors are oblique as in the cut-away front, it is not so easy to have them swing about vertical hinges. Such a hinge could be arranged, it is true, and we have seen them; but they must project from the boiler, and they are unsightly and in the way. The best way to arrange the tube door in a cut-away front is to run the hinge along the top of it, horizontally, and to have the door open upward. But with such a disposition of things the door is not easy to handle, and, moreover, it must be supported in some way when it is open. For the purpose of support a hook and chain, hanging from the roof, should be provided; but there is a tendency among firemen to prop up such a door with a piece of scantling, even when the chain is provided. The hook is not easy to reach or to manipulate, and the scantling is in every respect, save one, equal to it. In working about a door, thus propped open, there is an excellent opportunity to accidentally kick out the prop and let the door come down on the workman, doing him very grave injury, and perhaps killing him.

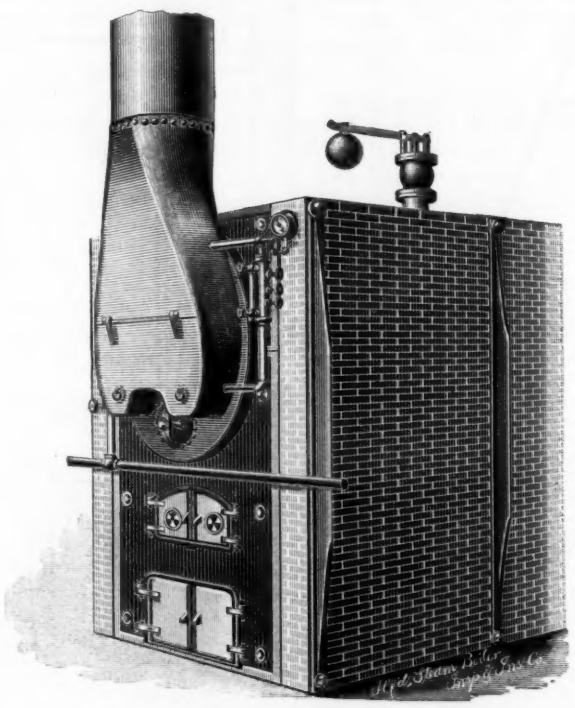


FIG. 7.—A BOILER WITH BREECHING.

It may be said that this accident does not often happen. That is true, and yet it is a good plan to make it impossible that it should happen, by using doors with vertical hinges.

Fig. 7 shows a boiler the setting of which is similar in general design to those represented in Figs. 3 and 5, except that in the place of a cast-iron front, it has bolted to it a short iron breeching that comes down over the tubes and receives the gases of combustion from them. In Fig. 7 a man-hole is shown under the tubes. This, of course, is not an essential feature of the breeching, but it will be seen that man-holes can readily be put below the tubes on fronts of this kind, in such a manner as to be very convenient of access.—[The Locomotive.

West Virginia Coke Making.

Although West Virginia contains, in several different parts of the State, continuations of the famous coal which has made for Connellsville coke an almost world-wide reputation, the coke men of that State have never succeeded in introducing their product into the market in such a way as to make it a strong competitor of the Connellsville article, says an exchange. Attempts have been made at various times, but for some reason or other West Virginia coke has not proved a very active rival to the Pennsylvania product. At one time West Virginia coke was tried in the furnaces at Wheeling. It was found to be almost equal to the Connellsville coke, and the difference in price more than made up the difference in quality. But still the older article remained the favorite with furnacemen.

Another effort, on a larger scale, is to be made to develop the fine thick seam of coking coal along the Baltimore & Ohio Railroad, near Clarksburg, West Virginia. The Acme Coal & Coke Co. owns a large tract of fine coking coal, and has optional leases on other tracts. One of these options is on a coal bed which is fifteen feet thick and said to be the thickest vein of coal, of that quality, in the world. These lands are located on the west fork of the Monongahela river, a short distance from the line of the Baltimore & Ohio. —[Tradesman.

THE UTILIZATION OF NIAGARA FALLS.

A contract was awarded on Saturday last to Rogers & Clemens, of this city, to construct a tunnel parallel to Niagara River for the Cataract Construction Co. The consideration involved is not announced. A bond in the sum of $300,000 has been executed by the firm. Work will be commenced immediately and must be finished in January, 1892. In 1886 the Niagara River Hydraulic Power Server Co. was incorporated by a special act of the State legislature. At various times the charter was amended, and the name finally changed to that of "The Niagara Falls Power Co." In July, 1889, this company awarded the Cataract Construction Co. the contract to construct at Niagara Falls works which will develop 119,000 horse-power. Since that time the contractor has been preparing plans and specifications for the work; the sub-contract just awarded is the first decided move which proves to the public that the preliminaries are nearly finished, and that it is certain the works are to be built. At the present time the contractor has a commission in Europe studying plans of plants of similar nature with a view of ascertaining the most practical method of constructing the Niagara plant. Up to date plans for any portion of the plant, excepting the tunnel, have not been adopted. Consequently the manner of connecting the tunnel with the upper river is not known. There will, however, be a canal either with or without a series of traverse surface conduits, which will conduct the water to penstocks and thence upon turbine wheels. The tunnel, which is to be merely a tail race, will receive the water from the turbines conducting it below the Falls. The details upon which this tunnel is to be constructed are at hand. It is to start at a point below the Falls under the Suspension bridge, extending through the rock to the upper river to a point 6,700 feet from its mouth, where a head of 120 feet will be obtained. It will be 28½ feet high, 18 feet wide, with a semi-circular top of 9 feet radius, and straight sides. The fall will be 36 feet to the mile.

The company owns 225 acres of land along the river suitable for mill sites, 75 acres under water adjacent to said land, and 1 100 acres lying back from the river about midway between La Salle and Niagara Falls. It has been estimated that the flow of water over the falls amounts to 12,785,455 cubic feet a minute. To develop 119,000 horse-power with a 120-foot fall would require but one-fifth of one per cent. of this volume. From these figures it will be seen that the power is almost inexhaustible. If this plant soon to be constructed, proves to be a success, and there is no reason to believe that it will not, the power now running to waste, reaching a figure almost beyond the comprehension of the mind, can be utilized by additional plants of similar nature.—[Engineering and Mining Journal, New York.

Magnetic Search for Iron Ores.

Mr. Sjoegren describes in *Warmlandska Annaler*, according to *Berg-u. Huettenm. Ztg.*, some interesting instances of magnetism employed preparatory to exploration work. In a shaft at Petersberg, Sweden, 186 meters deep, the ordinary mining compass failed to indicate the presence of ores, and work was in consequence suspended. In 1888, Tiberg's instrument was applied, and it showed a deviation, pointing to ore about 50 feet northward. On following up the clew, an ore-body was encountered, 50 by 45 feet of which have been opened without reaching the limits.

In another mine, previous to boring for exploring purposes, magnetic measuring was resorted to and carried out on several lines. All the arrows obtained in this way converging almost to one point, this was accordingly selected for the bore hole, and at a depth of 10 meters an ore-body 20 meters across was found.

This method is cheap and rapid, as from 400 to 500 feet can be examined by it in one day, or, inclusive of the drawing and calculation required, two days, and such investigation comprises from 70 to 100 feet at both sides of the line.

New Gasoline Engine.

In this issue our readers will notice that the Van Duzen Gas & Gasoline Engine Co. have made a change in their card. This enterprising company, having been the past year experimenting upon gasoline engines, and now they have a little wonder that does the work of a giant. A 6x7 inch engine, weighs only 800 pounds, occupies very little floor room, and runs 100 feet of shafting and machinery necessary to keep 20 machinists at work. A regular little hustler. This engine consumes from five to six gallons of gasoline daily, costing but 50 or 60 cents. Write for information and prices that will surprise you to the Van Duzen Gas & Gasoline Engine Co., Cincinnati, O., who are the patentees and manufacturers.

THE *Western Machinist* is hereafter to be published by the Western Machinist Co., articles of incorporation for which were filed with the Secretary of State on the 8th inst. It is understood that new features are to be added to the paper and additional energy put into the new company. Mr. F. N. Carter, who, until recently, was identified with the paper from its start, is again with it, being a stockholder and an associate editor; also Mr. Geo. A. Robertson who purchased the property of Mr. Carter last year. The president and general manager of the company is F. D. Leslie. The editor of *The Iron Trade Review*, having been interested in the inception and early development of the *Western Machinist*, takes pleasure in noting the forward strides of that excellent technical journal.

ONE of the most extensive iron manufacturers in the Shenango Valley, whose name is well known throughout the Shenango Valley, and whose home is in Sharon, remarked to a *Telegram* scribe the other day that he believed that the manufacturers of pig iron in the two valleys of the Mahoning and Shenango weren't making a cent out of their furnaces, and he followed this up by giving logical reasons for the belief.—[Youngstown Telegram.

THE ALLINGTON & CURTIS PATENTED DUST SEPARATOR.

This dust separator is built of steel and shipped in three sections, well crated to secure it from damage in transit. The parts separate at the points marked A and B in Fig. 1, and they are actually put together in the shop before shipping to insure a perfect fit. By building in three sections, the machines are much more easily handled and can be erected with half the help and labor, and the sections can be secured together in half an hour.

The manufacturers call attention to the peculiar form of the main separating chamber, being larger in diameter at the bottom than at the top, making the sides slanting. The walls of this chamber are not circular in form, but are laid up on a true spiral. The whole form, arrangement and proportions of this machine are deduced from careful and exhaustive experiments to determine just what will give the very least resistance to the air current, and still separate the dust successfully. The final air outlet is so arranged that it can easily be increased four inches in diameter and still work successfully, thus increasing the capacity of the fan without increasing its speed when it is desired to add more work to the pipes. This feature, it is claimed, is found only in this machine.

In operation, the discharge pipe from the fan is attached to the inlet opening of the dust separator by a straight connection, with no elbows, and the dust-laden air is blown into the main separating chamber at this point, where it is immediately caused to assume a rotary motion, thus developing centrifugal force, which acts on the dust particles and causes them to seek the portion of the machine having the largest diameter and collect in a layer on the interior surface of the walls of the machine. It is well known that air can be moved around a large circle or long elbow with much less resistance than around a small circle or short elbow, and it is for this reason that the manufacturers employ such large diameters in their machines. Any change of direction in an air current also causes serious resistance or back pressure,

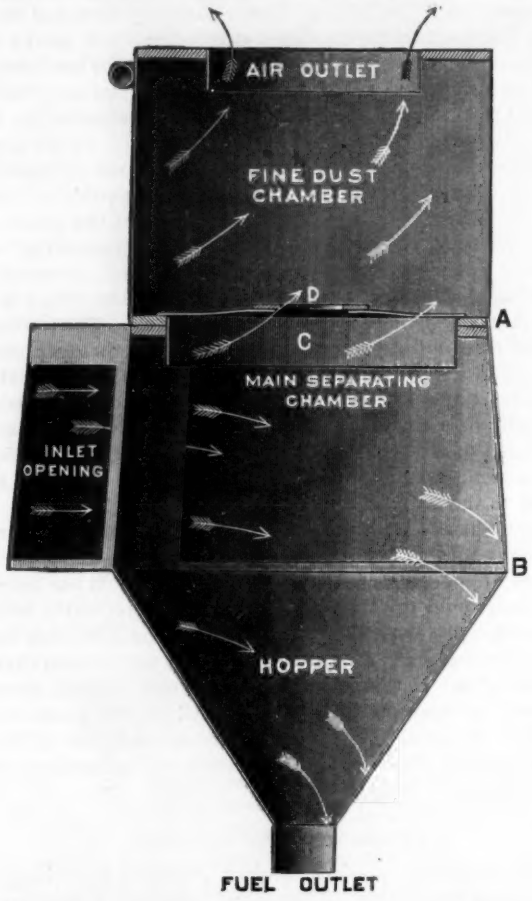


FIG. 1.

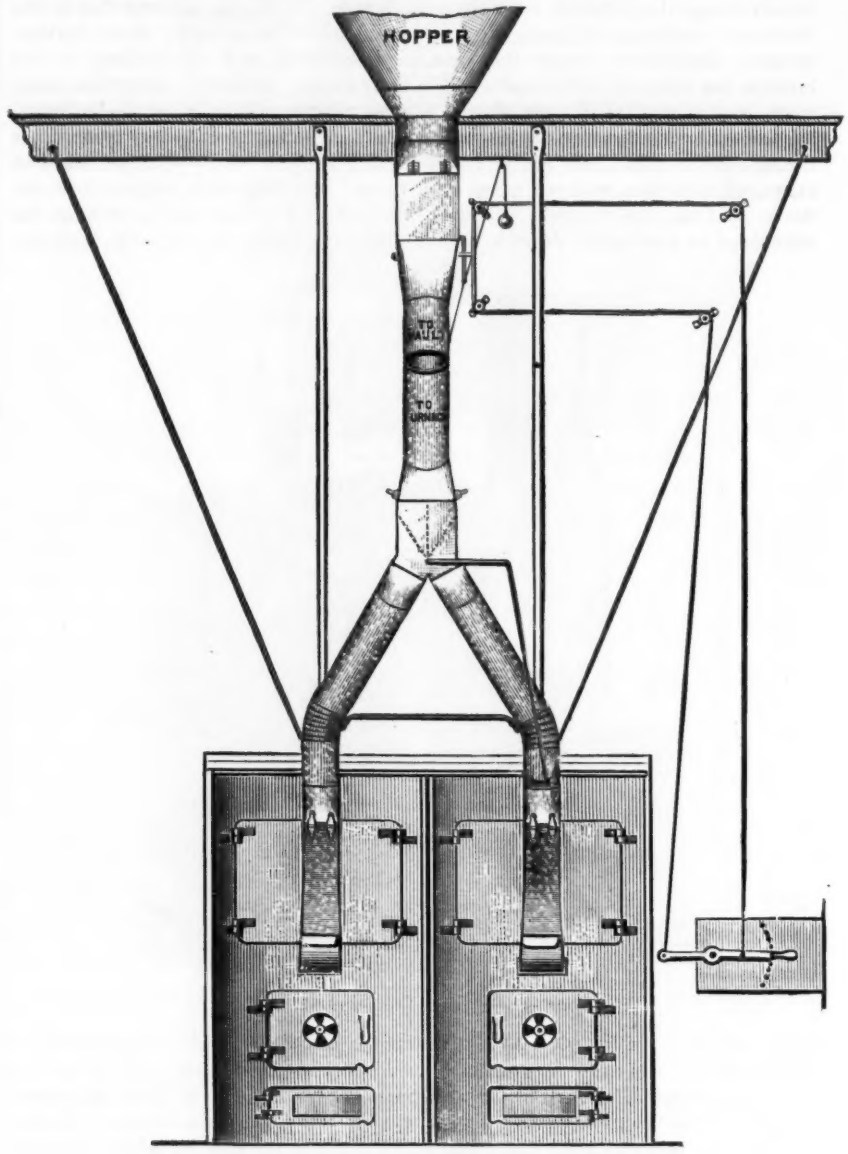


FIG. 2.

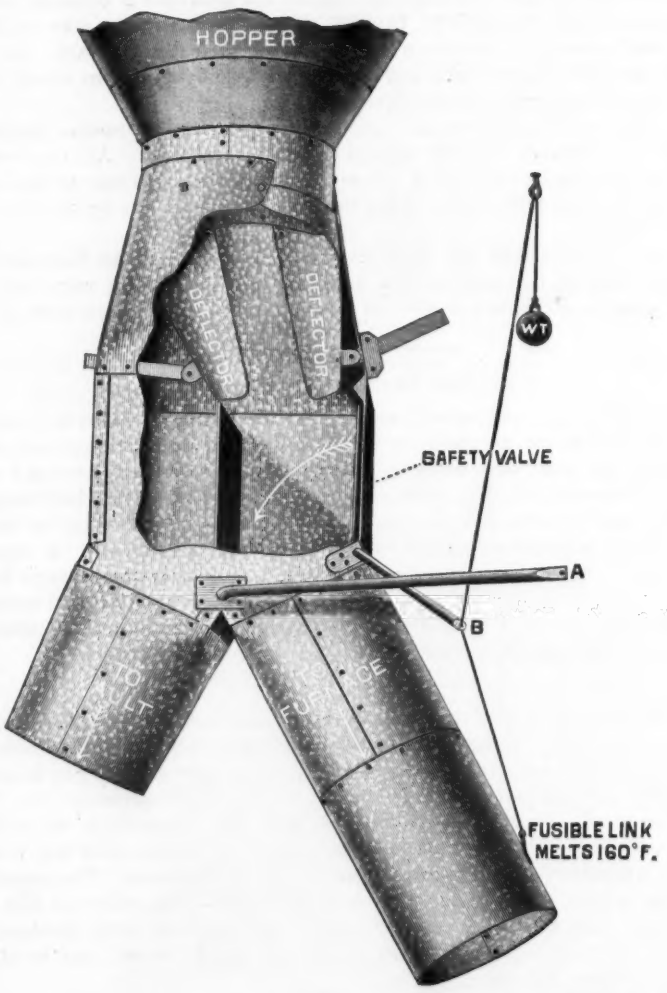


FIG. 4.

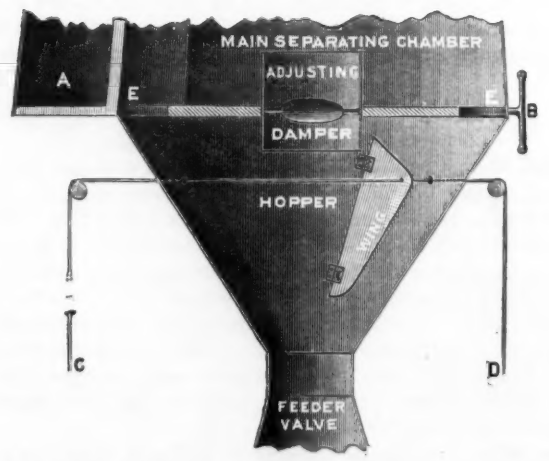


FIG. 3.

THE ARLINGTON & CURTIS PATENTED DUST SEPARATOR.

and it will be seen that in this machine its direction is only changed once, and that change in a very large circle, thus reducing the resistance to a minimum, and the revolving body of air then meets with no obstructions on the interior of the machine, but escapes freely through the air outlet at the top, the area of which, it is claimed, is much greater in proportion to the inlet than in any other machine.

As the dust or separated material collects on the inner surface of the slanting wall of the main separating chamber, it works its way toward the bottom by virtue of the slanting sides of the machine until it is caught by the guard, which has still more pitch and which directs the material into the hopper through the discharge opening. The material continues its rotary motion in the hopper and is finally discharged at the bottom through the fuel outlet with no air. The air which escapes into the hopper through the discharge opening is drawn back into the main separating chamber through the adjusting pipe and collar. The fine dust chamber is for the purpose of separating the very fine dust that escapes the main separating chamber, by increasing the length of time that the dust-laden air is passing through the machine, without affecting in any way its free passage, or, in other words, allowing of several more revolutions of the air current before its final escape into the outer atmosphere. Other machines seek to separate the fine dust by reversing the currents or passing them through obstructions of different construction. It is the peculiar form of this machine that accomplishes the work and allows the natural forces involved to act under their most favorable conditions.

Fig. 2 shows a front view of the two-boiler patent furnace feed. These feeders are constructed of the best galvanized steel, all riveted and soldered, and are supplied with their patented valves, nozzles and automatic safety valves, and all adjustments necessary to control perfectly the quantity of fuel fed to either or both furnaces or the vault, and also to regulate the current of air fed with the fuel. These feeders are attached directly to the hopper of the dust separator, and the fuel is fed through the pipes automatically, and the only attention required is an occasional shift of the valve or adjustment by the fireman. There is no fuel scattered on the floor between the furnaces and the vault, and thus one of the greatest dangers from fire is removed. The fuel is deposited on the grate in a direction natural to the draught of the furnace, thus avoiding all danger of back draught when the furnace doors are opened, and the automatic safety valve, it is claimed, is the only device that operates as a safeguard against fire without the attention of the fireman.

Fig. 3 illustrates the adjustments in the hopper of the dust separator, by which the flow of air to the feeders is regulated from no blast at all to a blast too strong for practical purposes, or to a blast anywhere between these two extremes, and all without affecting the division of fuel. The primary adjustment is the damper in the adjusting pipe. When this is open no air will flow to the feeders, and in proportion as it is closed the air will flow into the feeders. When entirely closed, if the flow of air is not sufficient to feed the fuel properly, resort is had to the secondary adjustment, which is the wing, which should be folded flat against the hopper, except when the damper is closed and it is required to use the wing to get more blast, then in proportion as the wing is opened the blast is increased.

Fig. 4 illustrates the dividing valve and adjustments for controlling the supply of fuel without affecting in any way the perfectly independent control of the flow of air to be fed with it. The valve is attached directly to the bottom of the hopper of the dust separator, and the adjustable deflectors at the top are for the purpose of directing the flow of fuel toward the center of the valve, where it can readily be divided in any proportions by the main valve with very little motion, thus avoiding the cutting off of the air supply in case the fuel should naturally flow to one side or the other of the valve from the hopper. This is a very necessary adjustment in the upper valve as well as the lower valve when two furnaces are fed, in order not to interfere with the equal flow of air to the furnaces.

Recent decisions in the United States Circuit Court have fully sustained the patents held by the manufacturers, the Allington & Curtis Manufacturing Co., 150 Brady street, East Saginaw, Mich.

THE average cost per mile of a trans-atlantic cable is about $1,000.

THE TACK INDUSTRY.

A letter from Taunton, Mass., to the Boston *Advertiser*, makes public the following information relative to the tack manufactories of the Union: The tack industries of Taunton are among the most important in the Commonwealth Massachusetts is the great tack manufacturing State in the Union, and the most successful plants are located in Taunton and vicinity.

Careful investigation shows that this city is pre eminent in furnishing advantages for the manufacture of tacks and small nails, and factories here can successfully compete with the majority in the West and South.

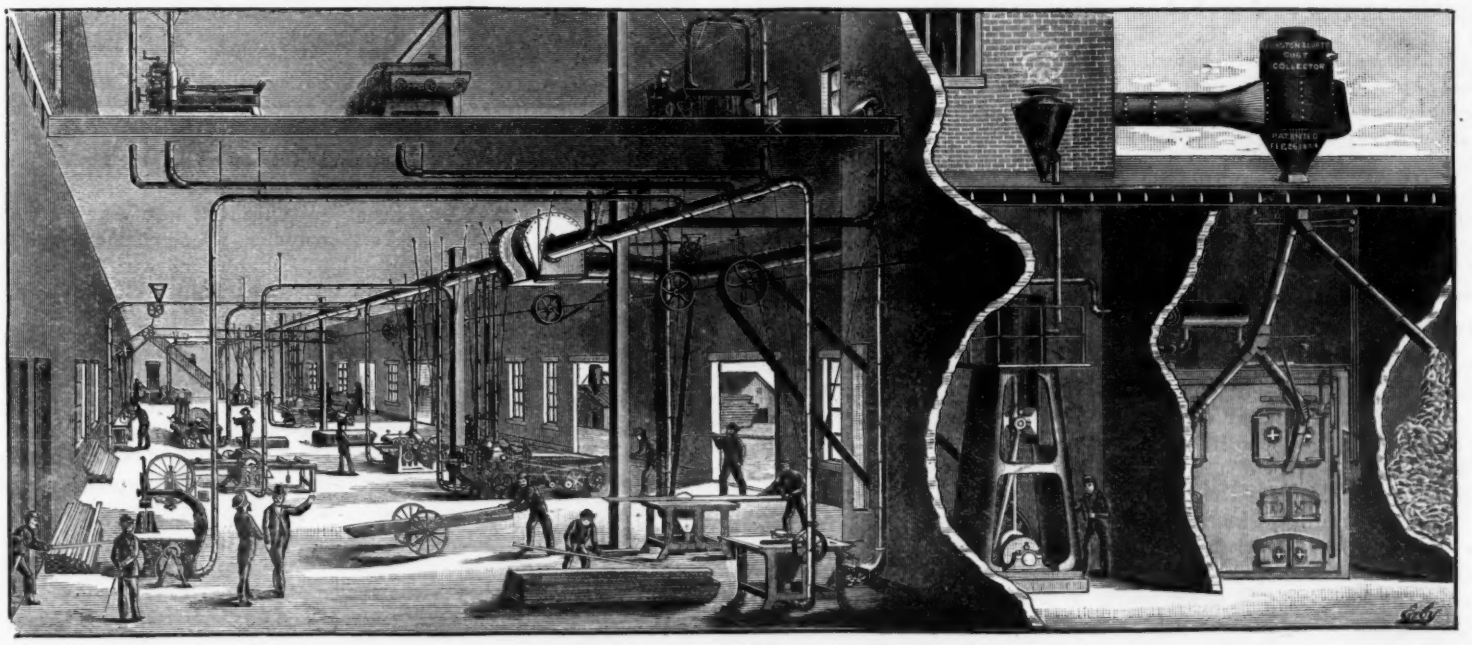
The latest statistics on the tack industry show that 13 States are interested in the tack industry, as follows:

State.	Concerns.	Machines.	State.	Concerns.	Machines.
California	1	75	New Jersey	2	10
Connecticut	4	165	Ohio	5	101
Delaware	1	6	Pennsylvania	7	213
Illinois	5	155	Rhode Island	2	30
Maryland	2	37	West Virginia	1	35
Massachusetts	58	2,045	Wisconsin	3	47
Missouri	1	4			
Total				92	2,923

Since the above table was prepared several concerns have gone out of business. Three of these were located in Massachusetts, one in Maryland, one in Wisconsin, four in Pennsylvania, of which two were located in Pittsburgh. There are no tacks made at present in Missouri, Delaware or Maryland, so that the number of States has been reduced to 10 and the number of machines made idle since the year 1886 is nearly 8 per cent. of the total number then running. The statement made by some that the Western tack manufacturers can make goods cheaper than Eastern men, is said to be misleading by prominent manufacturers in this city. It is true that the West has cheap motive power, and wages may not be quite so high as in the East, but a comparison of cost of material and of manufacturing and preparing goods for the market with the cost of same in Massachusetts, shows that the balance of advantages is largely in favor of the latter.

The great advantage that the Eastern manufacturer has over the Western is in handling of material used. A large portion of the iron consumed comes from Europe and has never been made in this country. American ores, it is said, are not of proper quality. There is considerable local competition in the business and this tends to keep prices down as well as profits, and Eastern plants can undersell those in the West, even in the territory naturally covered by the latter. Several attempts have been made to establish this industry in the South. A tack factory was started a few years ago at Birmingham, Ala., but the works were closed for an indefinite period about two months ago. Two concerns at Pittsburgh, the centre of the coal and iron region of Pennsylvania, have been compelled to close their works from financial difficulties, due mainly to unequal competition of Eastern factories that could handle their material cheaper.

This branch of the iron business in New England is to-day practically in the hands of Massachusetts. More than two-thirds of the tack business is controlled by this State and fully three-quarters by all of New England. From the present outlook there is not much likelihood of New England losing its grasp on the tack industry.



PIPING SYSTEM, WITH ALLINGTON & CURTIS FEEDER.

Fire from Steam Pipes.

In an article on the danger of fire from steam pipes, in a German paper, it is said that after wood has remained a long time in contact with steam, hot water or hot air pipes, the surface becomes carbonized, and during warm weather the charcoal absorbs moisture; when again heated the moisture is driven off, leaving a vacuum into which the fresh air current, circulating around the pipes, rapidly penetrates and imparts its oxygen to the charcoal, causing a gradual heating and eventually combustion.

THE perfection of ventilation is now attained by electricity. The new United States man-of-war, Baltimore, is supplied with an electrical ventilator which will change the atmosphere of the engine-room completely in two minutes.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

VERMILION AND MESABA RANGES.

The property of the Empire Iron Co., of Duluth, which has filed articles of incorporation with the Secretary of State, lies four miles south of Ely, and consists of 160 acres. There is a good outcrop of iron and jasper, from two to six rods wide. Operations towards developing the property will be commenced, in all probability, this Fall, and indications point to a rich strike of of ore. Adam T. Scarlet, of this city, discovered the outcrop last May, and the capital stock, which is placed at $200,000, is all held by Duluth parties, who are also the incorporators. These gentlemen are: A. T. Scarlet, S. F. White, Nels Hall, W. A. Holgate, E. J. McLaughlin, R. P. Edson, T. C. Himebaugh, Daniel Cash and A. M. Kilgore.—[Duluth Herald.

MARQUETTE RANGE.

Exploratory work at the North-east Negaunee was suspended September 15th. Three holes were bored by a diamond drill to an average distance of 300 feet, without any satisfactory result.—[Negaunee Iron Herald.

Parties having an option on property owned by Charles Werner, some three miles from the Pioneer mine, are greatly encouraged by the developments of recent explorations. The work still continues, and some encouraging reports may be looked for in the near future.—[Negaunee Iron Herald.

The work of opening the No. 7 Jackson shaft, closed some weeks ago by a cave-in, has been completed to a depth of about 120 feet from the surface, leaving from 20 to 25 feet more before connection is made with the lower part of the shaft, which was left intact. The new work has been well done, and the shaft when completely finished will be one of the finest of the company. –[Negaunee Iron Herald.

GOGEBIC RANGE.

Captain John S. Buddle, superintendent and mining captain of the North Pabst, at Ironwood, Mich., was in the city several days this week. He was quite elated over a big find of ore just found by a diamond drill. The shaft is 375 feet in depth, and the diamond drill, which is working at the bottom of the shaft, struck ore at a distance of 530 feet from the surface. Up to Thursday morning 36 feet of solid ore had been drilled into, with no signs of reaching the bottom of the vein. The work of sinking the shaft down to the ore will be commenced before long, but will prove quite a laborious task, inasmuch as 150 feet of very hard rock—quartz and jasper—will have to be gone through. The management intend to purchase considerable machinery at once, including an air-compressor, a 60 horse-power boiler, a power drill, etc. The North Pabst Mining Co. is composed of A. Spuhier, M. J. McCormick, John Case, H. Bertram, Wm. Marvin, John Sorenson, of Green Bay; C. W. Day, De Pere; Ed. Day, Greenleaf, and others.—[Florence Mining News.

It is rumored, but at this writing not substantiated, that a most excellent body of ore has been found under the main dyke in the seventh level of the Colby mine. A good thing for Bessemer, if true.—[Peninsular Record, Ishpeming.

MENOMINEE RANGE.

James Charnley and other Chicago capitalists have secured options from Abel Keyes, of Menasha, and John H. Van Dyke, of Milwaukee, on the southwest quarter of the northeast and the southeast quarter of the northwest quarter of section 25, 40-17, both forties adjoining the Guensburg Mining Co.'s option, and in the vicinity of the Keyes Lake mine, under operation by the Baird Iron Mining Co. The Charnley Co. commenced exploring for iron last week.—[Florence Mining News.

The Florence Iron River Co. is sinking an exploring shaft on the southwest side of the "mine hill," just across the line in section 21, a few rods from the depot. The shaft is now down nearly 50 feet in mixed ore, and it is believed the regular Florence vein will be found at a depth of between 100 and 150 feet. Work has been temporarily suspended at No. 8 shaft, pending the completion of the new hoisting plant. The Florence now leads its old-time rivals, the Iron River and Dunn, by nearly 50,000 tons in the extent of its shipments. The Florence ranks No. 11 among the shippers of the Menominee, Gogebic, Marquette and Vermilion ranges.—[Florence Mining News.

The Baird Mining Co. has been organized in Florence, with the following incorporators and directors: Geo. W. Baird, A. E. and E. Guensburg, Florence; M. St. Peter, Iron River; A. Lustfield, Crystal Falls. The following officers were elected: President, Geo. W. Baird; Vice-President, M. St. Peter; Secretary and Treasurer, A. E. Guensburg; Executive Committee, Geo. W. Baird, A. E. Guensburg and Emil Guensburg. The company is the owner of the very promising exploration on the southwest quarter of the southeast section of 25, 40-17, near Keyes Lake, and about three miles from this city.—[Florence Mining News.

Recent assays of an average of 500 tons of ore from the Little Commonwealth show 59.80 per cent. of metallic iron. The ore sampled was taken about 100 feet below the surface, showing that the quality of the ore has greatly improved. From test pits that have been sunk there are indications that the vein has a width of 100 feet, and the prospects of developing a valuable property at this exploration are very encouraging.—[Menominee Range.

To Inspect the Mines:—

It is said that amongst the British visitors who are to be here next month will be numbered several gentlemen who come to inspect the mines in which foreign syndicates are said to be interested. Among the latter are some of the Schlesinger group. It is said that if the examination proves satisfactory, the American syndicate will turn over the properties to the foreigners. When the latter see the way the ore is coming out of the Chapin and the East Negaunee range properties, they will probably ask that the transfer be speedily made. Mr. Schlesinger is working his different properties for all there is in them. He evidently argues that the ore is better out of the earth than in it. It is also further rumored that among this crowd of visitors will be men who come to examine the Vermilion mine of the Minnesota Iron Co., there having been some deal on foot as to their purchase by the foreigners. The different rumors being true, this party of iron men from abroad represent considerable capital that is looking for investment in our fields.—[Iron Ore, Ishpeming.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, September 17th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Hortense	2,065	Pitts. & L. Angeline	198,198
Barnum	6,753	Humboldt	16,544	Prince of Wales	19,906
Buffalo	63,617	Imperial	20,588	Prout	9,947
Cambria	54,812	Jackson	85,321	Queen	78,388
Champion	178,013	Lake Superior	220,109	Republic	137,165
Cleveland	180,085	Lillie	26,023	Republic Reduction Co.	2,559
Cliffs Shaft	125,064	Lucy	37,027	Salisbury	71,064
Detroit	4,058	Marquette Ore Co	2 243	South Buffalo	98,237
Dexter	2,639	Michigamme	44,771	Volunteer	96,218
East New York	22,817	Milwaukee	24,603	Winthrop	64,643
Fitch	7,969	Negaunee	54,083		
Grand Rapids	5,245	New York	2,423		
Total, Marquette Range					1,936,747

MENOMINEE RANGE.

Aragon	22 683	Hamilton	16,443	Paint River	40,300
Armenia	20,916	Iron River	104,104	Perkins	6,059
Chapin	488,744	Ludington	61,687	Pewabic	12,565
Commonwealth	81,533	Mansfield	7,866	Shafer	37,541
Cyclops	42,249	Mastodon	50,317	Sheridan	595
Dunn	101,075	Mastodon South	514	Vulcan	93,216
Florence	148,947	Millie	23,957	Youngstown	30,326
Great Western	57,634	Monitor	13,815		
Half and Half	383	Norway	48,546		
Total, Menominee Range					1,511,744

GOGEBIC RANGE.

Anvil	23,681	Father Hennepin	9,634	Pabst	86,296
Anvil No. 2	6,716	Federal	11,012	Palms	20,737
Ashland	303,156	First National	105	Ruby	8,112
Aurora	166,750	Germania	29,221	Section 33	74,619
Brotherton	44,943	Iron Belt	79,717	Superior	21,988
Cary	57,216	Montreal	6,630	Trezona	35,659
Colby	154,449	Mt. Hope	46,489	Windsor	20,417
Davis	564	Norrie	599,803		
Eureka	20,717	Odanah	1,066		
Total, Gogebic Range					1,829,598

VERMILION RANGE.

Chandler	268,079	Minnesota Iron Co	406,680	Pioneer	5,928
Total, Vermilion Range					680,687
Grand Totals					5,985,776
To corresponding date of 1889					5,103 171

Our statement of ore shipments by lake from the mines of the Lake Superior region for the season to date shows that the total has very nearly reached 6,000,000 tons, the gain for the season over the shipments at the corresponding date last year being 882,605 tons. It will be seen from the figures given that the mines are holding up the volume of shipments much better than was anticipated, the prospect now being that the output of last year will be very handsomely exceeded. Low lake freights and a strong demand are having their effect on the mines, and it is not likely that there will be any abatement of the vigor with which they are pushing work until the close of navigation.

Fires in August.

The fire loss of the United States and Canada for August as compiled by the New York *Commercial Bulletin*, amounted to $9,009 100, a decrease of over two millions from the corresponding month last year, and whice in part compensates for the heavy July waste. The following table shows the comparative losses for the first eight months of the current and two preceding years:

	1888.	1889.	1890.
January	$16,040,000	$ 6,898 700	$ 9,179,300
February	11,213,500	12 800,000	7,387,025
March	9,918,100	10,912,000	8,466,300
April	11,326,350	15,987,000	8,285,520
May	9,188,500	9,915,300	8,838,100
June	9,594,400	7,755,000	5,655,000
July	10,508,470	11,020,500	14,723,500
August	10,235,000	11,153,850	9,009,100
Total	$88,025,320	$86,460,350	$71,543,845

The statement shows a gratifying decline so far this year of $15,000,000 in the fire waste as compared with that of 1889. During August there were 180 fires of a greater destructiveness than $10,000. Of these 86 showed losses of from $10,000 to $20,000; 59 of from $20,000 to $50,000; 19 of from $50,000 to $100,000; 12 of from $100,000 to $200,000, and 6 showed losses from $200,000 upwards; $942,000 being the largest single loss.

THE editors of Kentucky made a trip to Middlesborough, Ky., the center of the iron country of Southern Kentucky, September 11 and 12, by invitation of the English company that is developing that region. The sturdy English welcome of A. A. Arthur, Esq., resident manager of the company, supplemented by the graceful Southern courtesy of Thomas A. Arnolds, Esq., of the Middlesborough *News*, made the editors feel at home—and when the immense supply of fine quality iron ore and first quality of coal, almost within sight of each other, had been inspected, the visitors could see why the Englishmen were so willing to invest first in the land and now in erecting works to utilize the ore, and in building a town to accommodate the growing population. The quality of the iron is so good that the future output will be an important item in the supply for the United States, and as Mr. Arthur put it, "the rails, when finished, will go to England to compete with the best made in that country."

Reduced Mileage via the the Pennsylvania Line.

Passengers between Pittsburgh and Cleveland who hold mileage tickets of the Pennsylvania Company's issue may hereafter make the journey in either direction by surrendering 130 mileage coupons instead of 150 as heretofore. To obtain the benefit of the reduced mileage, tickets should be presented for exchange checks in Cleveland, at the ticket offices, Union station, Euclid ave., or Weddell House block; in Pittsburgh, at the Union station, at 110 Fifth ave., or at Allegheny station. Long mileage will be collected if tickets are presented on trains.

IMPORTANT PATENT DECISIONS.

A decision of interest to harvesting machine companies was published in the *Official Gazette* of August 9, 1890, in a suit in the United States Court, District of Minnesota, of Wm. Deering in three suits against the Winona Harvester Works and others which are consolidated, and one suit against the McCormick Harvesting Machine Co., for improvements in harvesters and binders. These suits were heard together. The first suits relate to the knotter by which the cord is held around a bundle of grain. The complainant and the McCormick Co. are extensive manufacturers and competitors throughout the grain producing regions of the world, and by their efforts have stimulated the inventive genius of the class of persons interested in the improvement and development of practical machinery for cutting and binding grain. The Winona Co. was a new enterprise, inaugurated under the superintendence of men formerly in the employ of complainant, and manufactured a machine in its general features and operation like those introduced and sold by the McCormick Co. The decision in this case was that the bill against the McCormick Harvesting Machine Co. must be dismissed and the complainant be entitled to a decree only against the Winona Harvester Machine Co. and others for an infringement of the knotter patents, Nos. 278,639 and 301,190.

The *Gazette* of August 26th contains the following:

Decisions of the United States Courts. United States Circuit Court, Eastern District of Pennsylvania, Schofield *et al.* vs. Dunlop *et al.* Suit for infringement of design patent for rugs. The suit was for infringing letters patent No. 18,996. The patent was decided valid and the infringement reasonably clear. A comparison of the plaintiffs' and defendants' rugs justifies a belief that the latter was copied from the former. No damages, however, could be awarded from want of notification that the article had been patented.

United States Circuit Court, District of Connecticut. Edison Electric Light Co. vs. Perkins Electric Lamp Co. Two cases. Duration of right with reference to foreign patents. Held that the United States patent does not expire before the end of the fifteen years' duration of such foreign patent, although before the expiration of the first five years the foreign patent may have lapsed or become forfeited by the non-observance of a condition subsequent, or by the happening of a subsequent condition, imposed by a statute of the country granting such foreign patent.

United States Circuit Court, Eastern District of New York. Pirkl vs. Smith *et al.* Design patent. The statute relating to designs only insists, in order to sustain an action for infringement, that the design shall have been applied without license; coupled with sale, the party selling knowing the design to be so applied already. The statute gives $250.00 as a measure of profits in cases where a less amount only can be proven and not as a penalty above the actual profits. A decree was entered for an injunction and $250.00 profits, with costs.

United States Circuit Court, Northern District of New York. Dederick vs. Seigmond. This suit was based upon the second claim of patent to A. A. Gehrt, on improvement in "baling press." The claim was declared functional in form, and the suit dismissed.

United States Circuit Court, Northern District of Illinois. Dable Grain Shovel Co. vs. Flint *et al.* This action was for an alleged infringement and damages. Found that inventor had made and put in use the invention before applying for patent, hence patent was not valid, and no damage could be awarded.

United States Circuit Court, Western Division of Virginia. Gravely *et al.* vs. Gravely *et al.* Bill filed to enjoin defendants from using the trade mark of complainants, which was registered under act of March 3, 1881. Decided that since the infringing parties had not used a similar trade mark in foreign sales that there was no jurisdiction for this case under the United States statutes at large; therefore dismissed.

Commissioner's decision. *Ex parte* Fenno, who failed to pay first fee on application within two years, and failed to prove that this was unavoidable. Held that the application was forfeited.

United States Circuit Court, Southern District of New York. Rapp vs. Kelling. Suit by John W. Rapp against Max Kelling for infringement of letters patent No. 416,265, issued to defendant for fire-proof doors. Defendant had granted to plaintiff the exclusive right to make, use and sell doors under the patent. Held that this contract was the equivalent of an assignment. Counsel not yet heard.

United States Circuit Court, Northern District of Illinois. American Cable Co. vs. Chicago City Railway Co. *et al.* This suit regards a patent which expired between the date of service and the return day. There being no cause for injunction, dismissed, since no injunction could be obtained from lapse of patent.

United States Circuit Court, Eastern District of Pennsylvania. American Split Feather Duster Co. vs. Levy. Suit for infringement of letters patent, No. 385,070, for split feather duster. Declared invalid for want of novelty, and suit dismissed.

United States Circuit Court, Northern District of Illinois. Cleveland Forge & Bolt Co. vs. United States Rolling Stock Co. On demurrer to bill that president of the corporation should be personally attached as defendant with the corporation. Demurrer overruled.

The full texts of the Japanese and Mexican patent laws are found in the *Gazette* for September 9 and 16, 1890.

A Long Blast.

A writer in *Stahl und Eisen* claims for No. 3 Vod der Heydt furnace, of the Borbeck Works, the best record for a long blast and a maximum output on one lining. The furnace was blown in on March 31, 1873, and blew out on July 15, 1890, making its campaign 17 years 3½ months. During that time it produced 355,236 metric tons of iron.

INDUSTRIAL SUMMARY.

New Enterprises:—

The Vulcan Boiler Co., at Findlay, O., has been incorporated with a capital of $35,000.

The Hydro-Carbon Burner Manufacturing Co., at Kansas City, Mo., has been chartered; capital stock, $11,000.

The Pittsburgh Foundry & Machine Co. has been incorporated at Pittsburgh, Crawford county, Kan.; capital stock, $50,000.

The Western North Carolina Iron Co., at Marion, N. C., has been organized, with B. C. Gaden, President, and J. H. Butler Secretary.

P. A. Brawner, Jr., and others have incorporated the Southern Malleable Iron Co., to erect a malleable iron plant at Chattanooga, Tenn.

The Dominion Railway Supply Co. has been incorporated, with a capital stock of $100,000, and will erect works at Windsor, Ont., for the manufacture of railway appliances, machinery, tools and supplies.

A company has been organized at Buena Vista, Va., to build and operate boiler and engine works. The officers elected are: A. K. Rarig, President; A. T. Barclay, Vice-President; J. H. Millen, Secretary.

Articles of incorporation of the Durango Steel & Iron Co. have been filed at Des Moines, Ia. The capital stock is fixed at $5,000,000, and the principal places of business are Des Moines, Ia., and Durango, Mexico.

The Pan Diamond Saw Co. has been incorporated at Alexandria, Va., with H. A. Parr, of New York City, as President, and ex-Congressman John M. Glover, of St. Louis, as Secretary. The capital stock is $500,000.

The Carolina Machinery Co. has been organized at Fayetteville, N. C., to establish machine shops. The capital stock is $20,000. A. B. Williams is President; M. A. Russell, General Manager, and W. S. Cook, Secretary.

The American Fibre Co., with C. H. Adams, President; J. J. Barr, Vice President, and J. C. Donavin, Secretary, has been incorporated at New Orleans, to manufacture defibrating machinery. The capital stock is $300,000.

The O'Donnell Elevator Co., Cleveland, has filed articles of incorporation with the Secretary of State; capital stock, $25,000; incorporators, G. M. J. O'Donnell, Henry Board, William C. Smith, William H. Bosworth and Fred C. Bosworth.

The Bonzano Metallic Railroad Tie Co. have been chartered in New Jersey, with a capital of $1,000,000, to manufacture steel railroad ties under the patents of M. F. Bonzano, assistant general superintendent of the Philadelphia & Reading Railroad.

The Brilliant Steel & Iron Co., of Wheeling, W. Va., has been incorporated under the laws of West Virginia, for the purpose of operating the old Spaulding Mill, at Brilliant. The incorporators are the gentlemen who purchased the mill at sheriff's sale recently. It is understood that they will not only make nails, as the old owners did, but will build a steel plate and sheet mill in connection with it.

At Richmond, Va., the Virginia Steel, Iron & Slate Co. have been incorporated for the purpose of mining and manufacturing any of the ores, minerals, metals, materials or products of Virginia, and to conduct business in one or more points in the counties of Albemarle, Nelson, Buckingham and Fluvanna counties. The capital stock is to be not less than $100,000 nor more than $2,000,0000, and real estate may be held not exceeding 100,000 acres. The main office will be in Richmond, Va. The following are the officers elected for the first year: President, F. T. Anderson; Vice President, H. W. Flournoy; Secretary, J. G. Hankins; Treasurer, J. E. Gaines; Directors, Messrs. Anderson, Flournoy, J. J. Hichok, Alexander Cameron and S. Blanchard, of Richmond, and T. P. Williams, of King's Mountain, N. C.

The following certificates of incorporation have been issued by the Secretary of State of Illinois: Homans-Elrick Steam Binder Co., Joliet, to manufacture harvesting machines and agricultural implements; capital, $50,000; incorporators, Edward Etheridge, Nathan Bennett and James F. Barnes.—Electric Railway Supply & Construction Co., Chicago, to manufacture electrical goods; capital, $100,000; incorporators, J. M. Berenston, M. A. Berg and others.—Burt's Electric Light, Fuel & Power Co., Chicago, for the manufacture of arc light and incandescent dynamos, lamps, motors, etc.; capital, $5,000,000; incorporators, Jennie L. Bennett, Allen S. Bennett, Martin C. Burt.—Chicago Wire Goods Co., Chicago, to manufacture wire goods; capital, $100 000; incorporators, Charles Kelley, B. W. McClellan and W. A. Hickey.—Chicago Elevated Railway Construction Co., to construct elevated railways; capital, $1,000,000; incorporators, Marshall Lapham, Dennis W. Sullivan and William M. Wilson.—National Unicycle Elevated Railway Construction Co., East St. Louis, to construct elevated railways, truss bridges, cars and motors; capital, $5,000,000; incorporators, R. E. Maddox, J. P. Taylor and others.—Whiteside & Fuller Electric Manufacturing Co., Chicago, to manufacture electrical machinery and appliances; capital, $100,000; incorporators, W. H. Whiteside, W. H. Pettibone, W. D. Carlile.—Collapsible Railway Car Co, Chicago, to manufacture collapsible railway cars and improvements thereon; capital, $100,000; incorporators, Louis C. Zolk, Henry F. Sanders, John T. Richards.

Enlargements, Additions, Removals, Etc.:—

The Cheraw Iron Works, of Cheraw, S. C., has increased its capital stock to $25,000.

The Deleach Manufacturing Co., of Atlanta, Ga., is putting up a new foundry and machine shop, 400x70 feet.

The Peterborough Lock Manufacturing Co., of Peterborough, Ont., will increase its capital stock from $50,000 to $200,000.

It is reported that the Henderson Steel Co., of Birmingham, Ala., will probably increase its capital stock $100,000, to erect an additional iron furnace, blooming train, etc.

It is stated that at Goshen, Va., the Woodcook Iron Works, of Auburn, N. Y., are to be moved to that place, and that this enterprise will be followed

by the removal of a pipe works from Syracuse, N. Y. It is further stated that the Keystone Machine Co., of Williamsport, Pa., intend moving their machine works to Goshen.

A Milwaukee (Wis.) special says Wood Harvester Co., of Troy, N. Y., contemplate establishing a branch factory in that city, following the action of the Fuller & Warren Stove Co., with whom they are closely allied.

The Apollo Iron & Steel Co., Apollo, Pa., have just completed the erection of a new sheet mill as an addition to their plant, and have broken ground for three more sheet mills and a plate mill. A tinplate mill is also contemplated.

Fires and Accidents :—

The malleable iron works of Sweet & Clarke, at Marion, Ind., were recently damaged $2,000 by fire.

The plant of the Falls City Malleable Iron & Steel Works, Louisville, Ind., was recently destroyed by fire. The loss was fully covered by insurance.

A fire broke out in Robb & Son's foundry and machine shop, at Amherst, N. S., September 3, and they, together with the offices and warerooms and all their contents, were completely destroyed. The loss is $50,000.

A portion of the works of the Totten & Hogg Iron & Steel Co., Pittsburgh, were destroyed by fire on the 17th. The fire originated in the core room, and the entire interior of the building was gutted. The loss will reach $5,000, which is fully covered by insurance. The company informs this paper that no interruption in the filling of orders on hand will occur, and that the damaged building will be torn down and replaced with a larger iron structure.—[American Manufacturer.

Furnaces and Works Starting Up :—

The Crescent Nail Mill, at St. Louis, Mo., started up on the 8th inst.

The blast furnace of the Riverside Iron Works, at Steubenville, O., which has been undergoing repairs for some time, resumed operations last week. The improvements made were very extensive, and the furnace is practically a new one. The output of the furnace is expected to show a good increase.

The Fort Payne Furnace No. 1, at Fort Payne, Ala., went into blast on Monday, the 8th inst. The fire was lighted at 9 A. M., and the blast turned on at 3 P. M. The gas was fired in boilers and stoves, without the slightest explosion. At 6 A. M. Tuesday she made a first flush of good cinder and on Wednesday, at 5 A. M., the first cast, eight tons of gray forge. J. H. Mullin, the Superintendent, reports that it is now running nicely on No. 3 foundry, not having made a pound of white or mottled iron. The furnace is now running on a mixture of 50 per cent. brown ore, 25 per cent. red hematite and 25 per cent. soft hematite.

General Industrial Notes:—

The Aetna Machine Co., of Warren, O., lately closed a contract with Messrs. C. W. Tuttle & Co., Auburn, N. Y., for a 250 horse-power engine to drive a train of rolls in their mills at Auburn.

Mr. Joseph Breslin having retired from the Breslin Manufacturing Co., Mr. G. Enneking and J. F. Trautman, the remaining members of the firm, under the name of Enneking & Trautman, will continue the manufacture of their universal milling machines, drill presses and machine tools, at the old stand of the Breslin Machine Co., No. 211 East Pearl street, Cincinnati, Ohio. This new firm will be pleased to meet in person any one needing any of their machines, and letters of inquiry will receive every attention.

The Totten & Hogg Iron & Steel Foundry Co., Pittsburgh, Pa., manufacturers of Forster's rock breaker for coarse and fine crushing, railroad ballast, macadam, etc., have just issued a catalogue descriptive of the machine and setting forth its special advantages, some of which are : simplicity of construction, small amount of power to operate, easy to work and move from place to place. The same concern also manufacture iron and steel pinions, chilled rolls, trains for all kinds of iron mills, shears, squeezers, etc.

A model plant in every respect is that of the Cambridge Iron & Steel Co., Cambridge, O. Mr. A. Beard, the General Manager, though a young man, has had twenty years' experience in the business, coming to this country recently from Birmingham, England. He has shown rare judgment in the selection of a site as well as in laying out his mill, which is stocked with the best modern machinery. The mill occupies an ample site of ten acres, with switches connecting with the Baltimore & Ohio and the Cleveland & Marietta railroads. The product is exclusively iron and steel sheet, and the order book shows an exceedingly healthy trade and a promising outlook.

The I. & E. Greenwald Co., Cincinnati, have made the following contracts for engines, boilers and other machinery within the last few weeks. Krippendorf, Dittman & Co., shoe factory, Cincinnati, 16″x42″; H. Lackman Brewery, Cincinnati, 14″x36″; J. B. Mitchel, Cincinnati, 16″x42″; T. B. Ripy, Lawrenceburg, Ky., 10″x16″ slide valve, boilers and distillery machinery; Waterfill & Frazier, Lawrenceburg, Ky., 10″x16″ slide valve engine, and boiler and distillery machinery; J. B. Ripy, Lawrenceburg, Ky., three 48″x22″ flue boilers for distillery; J. M. Shott, Camp Washington, Cincinnati, 8″x16″ engine, boiler and shafting ; Jno. Hauck Brewing Co., elevators and conveyors for their new malt house.

Eberts Bros., 192 to 198 High street, Detroit, Mich., are excellent examples of perseverance and strict attention to business in the line of iron roofing. From a small beginning they have increased their business, until now they occupy a building 113x115 feet, two stories high. They handle not only iron and steel roofing, but also roofers' sundries, such as felts, tar, pitch, asphaltum, paints, asbestos paper, etc., and their trade extends from Maine to California. The iron and sheet roofing manufactured by them is of excellent quality, and is made in all shapes and for all classes of buildings, and is easily put on. They are men of practical experience in all kinds of roofing, and any one desirous of knowing more about this subject would be profited by sending for their circulars, which will be furnished on application.

THE RONEY MECHANICAL STOKER AND SMOKELESS FURNACE.

The most extensive application of mechanical stokers in connection with coal and ash-handling machinery in this country, and probably in the world, is at Claus Spreckles' sugar refinery, Philadelphia, Pa., and is illustrated on the following pages. This plant, the contract for which was awarded to Westinghouse, Church, Kerr & Co., consists of 60 Roney stokers, with coal and ash-handling machinery, serving a battery of 7,500 horse-power Babcock & Wilcox boilers, arranged in two tiers, one above the other, while a coal bunker with a capacity of 3,000 tons occupies the third story of the boiler-house. The boilers are arranged in batteries of 500 horse-power each, with four stokers to each battery, and each double battery of eight stokers operated by a small Westinghouse engine, placed conveniently upon a bracket bolted to the iron columns supporting the floor above. The boiler-house is fire-proof throughout, being constructed entirely of brick, iron and stone.

The fuel used is Cumberland "run-of-mine" coal, and is delivered by cars on track alongside the boiler-house. Underneath this track are placed two toothed roll crushers, large enough to receive and crush the largest masses of coal thrown into them. Under the crushers, and between the rails, are placed hoppers capable of holding a car load each. A pair of spiral conveyors connect the crushers with vertical bucket elevators having a capacity of a ton a minute, and either one capable of handling sufficient coal to supply the entire plant of boilers. The coal is unloaded by dropping the bottom of the car, and as fast as crushed is delivered to the elevators, which discharge it by means of cross conveyors at the top of the building into one long conveyor, distributing it the entire length of the coal bunker. The crushed coal, which is the size of small egg and under, flows by gravity through branched chutes to the stoker hoppers. Gates at the bottom of the chutes regulate the quantity of coal delivered to each stoker, so that the hoppers are at all times full. When a battery is shut down these gates are closed, and the coal in the chutes remains stationary. The ash and cinder from each pair of stokers fall into iron ash pits under each floor, whence they are discharged into a horizontal conveyor in the basement, the ashes from the upper tier of boilers being conducted through iron chutes placed between the batteries of boilers on the first floor. An elevator at one end of the boiler-house receives the ashes and delivers them into an ash-bin sufficiently elevated to discharge by gravity into cars outside the building for removal. One Westinghouse engine furnishes the necessary power for all the coal and ash machinery.

So perfect is the entire system of crushers, conveyors and elevators that there is no handling of coal or ashes from the time the bottom of the car is dropped until the refuse is discharged into cars for removal, and in its freedom from dust, heat and smoke this boiler-house rivals the most successful steam plants fired by natural gas.

This stoker is adapted to burn the following fuels: bituminous, semi-bituminous and lignite coals, without smoke; anthracite when mixed with a small proportion of soft coal, run-of-mine, slack, mixture of anthracite yard screenings and soft coal slack, cotton-seed hulls, rice hulls, chaff, bagasse and waste products generally. The apparatus receives the fuel in bulk, and thereafter, without further handling, feeds it continuously and at any desired furnace; burns the combustible portion and deposits the ash and cinder in the ash-pit ready for removal. The fuel to be burned is dumped into the hopper on the boiler front. In small plants it may be shoveled in by hand. In large plants it is usually handled direct from the car to the hopper by elevators or conveyors.

Set in the lower part of the hopper is a pusher, see Figs. 1 and 2, to which is attached by a flexible connection the feed plate forming the bottom of the hopper. The pusher, by a vibratory motion, carrying with it the feed plate, gradually forces the fuel on to the grates over the dead plate. The grates consist of horizontal flat top bars running from side to side in the furnace, carried on inclined side bearers extending from the throat of the hopper to the rear bottom of the ash-pit. The grates form a series of steps, onto the top step of which coal is fed from the dead plate. The inclination is not sufficient to cause the free descent of the coal. Each bar rests in a concave seat in the bearer, and is capable of an adjustable rocking. All the grate bars are coupled together by a rocker bar, the notches of which engage with a lug on the lower rib of each grate bar, pin connections being made with two of the grate bars only, for the purpose of holding the rocker bar in position. A variable back-and-forth motion being given to the rocker bar, through a connecting rod, the grate bars necessarily run in unison. Assuming the grates to be covered by a bed of coal, and fresh fuel being fed in at the top, it is obvious that when the grates rock forward the fire will tend to work down in a body. But before the coal can move too far the bars rock back to the stepped position, checking the downward motion, breaking up the cake thoroughly over the whole surface and admitting a free volume of air through the fire. The rocking motion is slow, being from seven to ten strokes per minute, according to the grade of the coal. This alternate checking and starting motion, being continuous, keeps the fire constantly stirred and broken up from underneath, and finally lands the cinder and ash on the dumping plate below. By releasing the dumping rod the dumping grate tilts forward, throwing the cinder into the ash-pit. The dumping grate is made in two parts, so that each half can be dumped separately. The operation of the stoker consists of a slow but continuous feed, a constant stirring of the fire, and an automatic rejection of the cinder, all performed without opening the fire doors.

The actuating motion is taken from one driving shaft. In a single stoker this shaft may either be driven through a worm gear, from a small engine attached to the boiler front, or may be driven by a link belt from any convenient shaft. In large batteries of boilers, the driving shaft is extended across all the boiler fronts, delivering power to each stoker, as shown in the large cut, and with the elevators and conveyors is driven by a small, independent engine. The largest stoker can easily be turned over by hand. The worm gear shaft carries a disc and wrist pin, from which a link couples to the agitator,

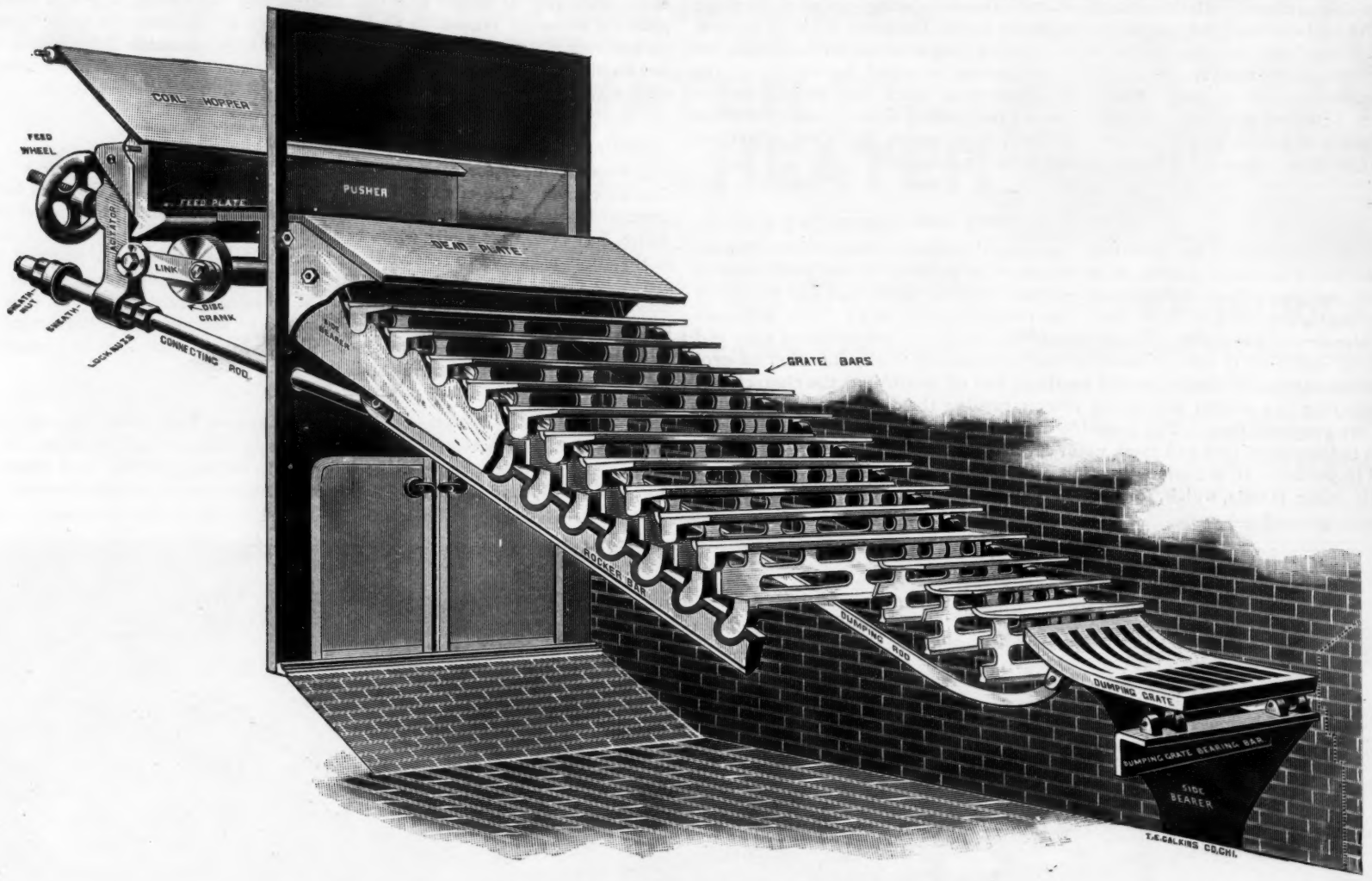


FIG. 1.—THE RONEY MECHANICAL STOKER.

see Figs. 2 and 3. Through the eye of the agitator passes a stud screwed into the pusher, on which stud is a feed wheel by which the stroke of the pusher, and, consequently, the amount of feed is regulated. The agitator having a fixed stroke, it is apparent that if the feed wheel is run down against it, in the position shown in the engraving, the pusher will be given its full traverse and the greatest feed. If run back to clear the travel of the agitator, the pusher will, of course, have no motion, and the feed will stop. Between these extremes any desired rate of feed can be given.

In like manner the rock of the grate bars can be adjusted between any limiting angles, and over a range of motion from no movement to full throw, by means of the sheath nut and jam nuts on the connecting rod. By these two simple adjustments, within the comprehension of the ordinary helper, the whole action of the stoker is controlled, and the fires forced, checked or banked at will. There are poker doors in the front on each side of the hopper, through which the whole grate can be seen, and the condition of the cinder on the dumping grate determined. A gate controlled by a couple of hand wheels shuts off the hopper from the furnace altogether when desired. If the location is convenient, a cleaning door may be introduced into the side of the furnace to facilitate examination of the boiler.

It is hard to conceive of a simpler device. It is strong and well built, and there are few pin connections or finished parts. The strains are light, and the motion is so slow as to be hardly perceptible to the casual observer. Any single bar can be picked out and replaced as easily as in the ordinary flat grate, and, in case it is necessary, the lower two bars, where the greatest wear takes place, can be replaced without cooling down the furnace.

It will be of interest to our readers to know that Westinghouse, Church, Kerr & Co. have just completed for the Pennsylvania Railroad Co., at the new shops at Altoona, a model plant of Roney stokers, applied to horizontal tubular boilers, in connection with coal crushers and coal and ash handling machinery. This plant is so arranged that the coal, when unloaded from the car, is handled in the same manner as in the plant here described. The boilers in the magnificent new passenger station of the Wisconsin Central, at Chicago,

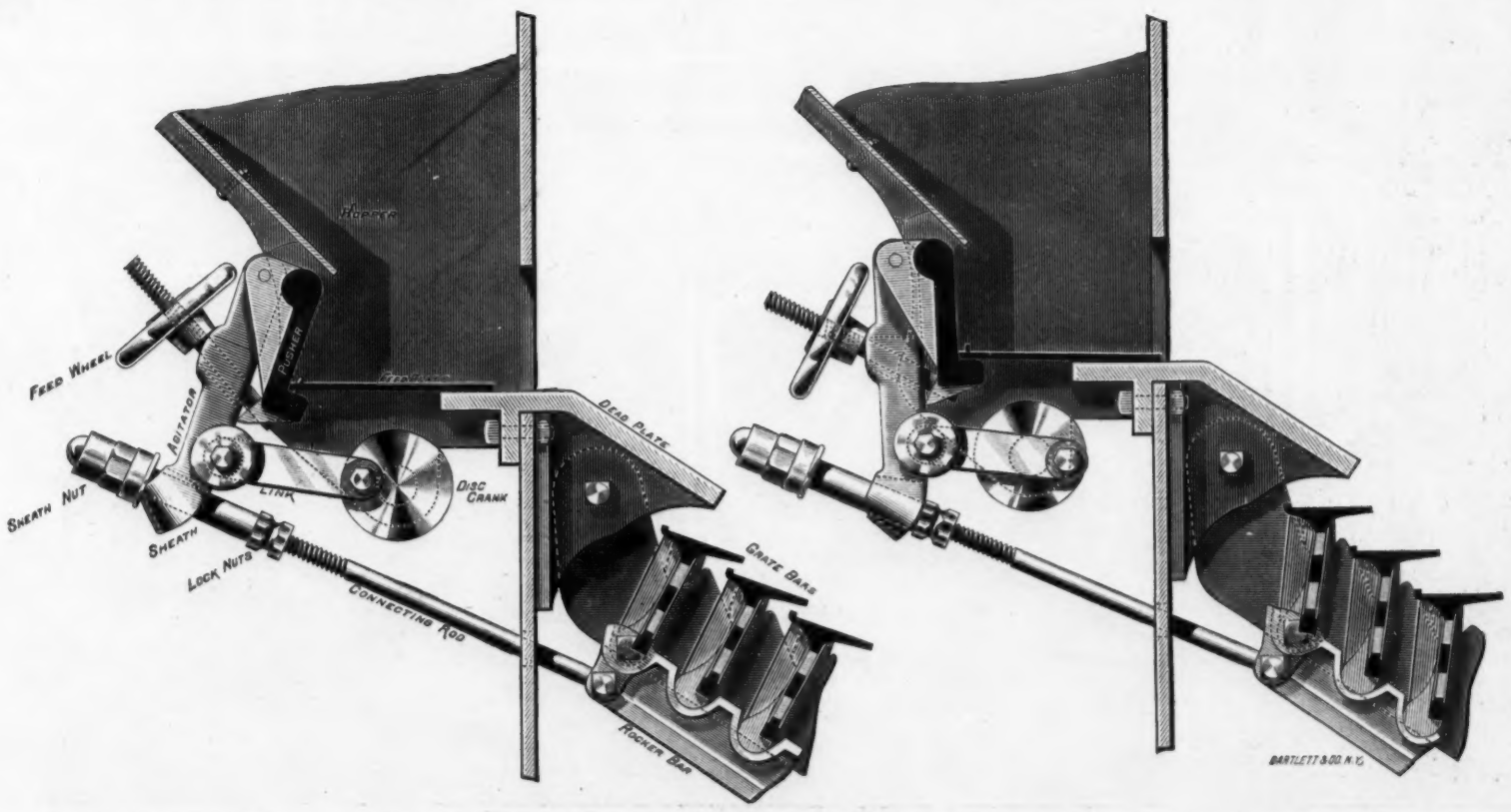


FIG. 2.—INCLINED POSITION. RONEY MECHANICAL STOKER—DETAILS OF FEED AND GRATE MOVEMENT. FIG. 3—STEPPED POSITION.

are also equipped with this stoker. Many stokers are being applied in the large steel works around Pittsburgh, where, owing to the increased price of natural gas, nearly all the large concerns are making preparations for returning to coal for steam making. The perfect combustion obtained by means of the automatic stoker makes it possible to obtain from slack coal results heretofore obtained only from the best screened lump when fired by hand; and the absence of smoke, due to the perfect combustion, makes it a rival of natural gas in cities where the soft coal smoke is such a nuisance.

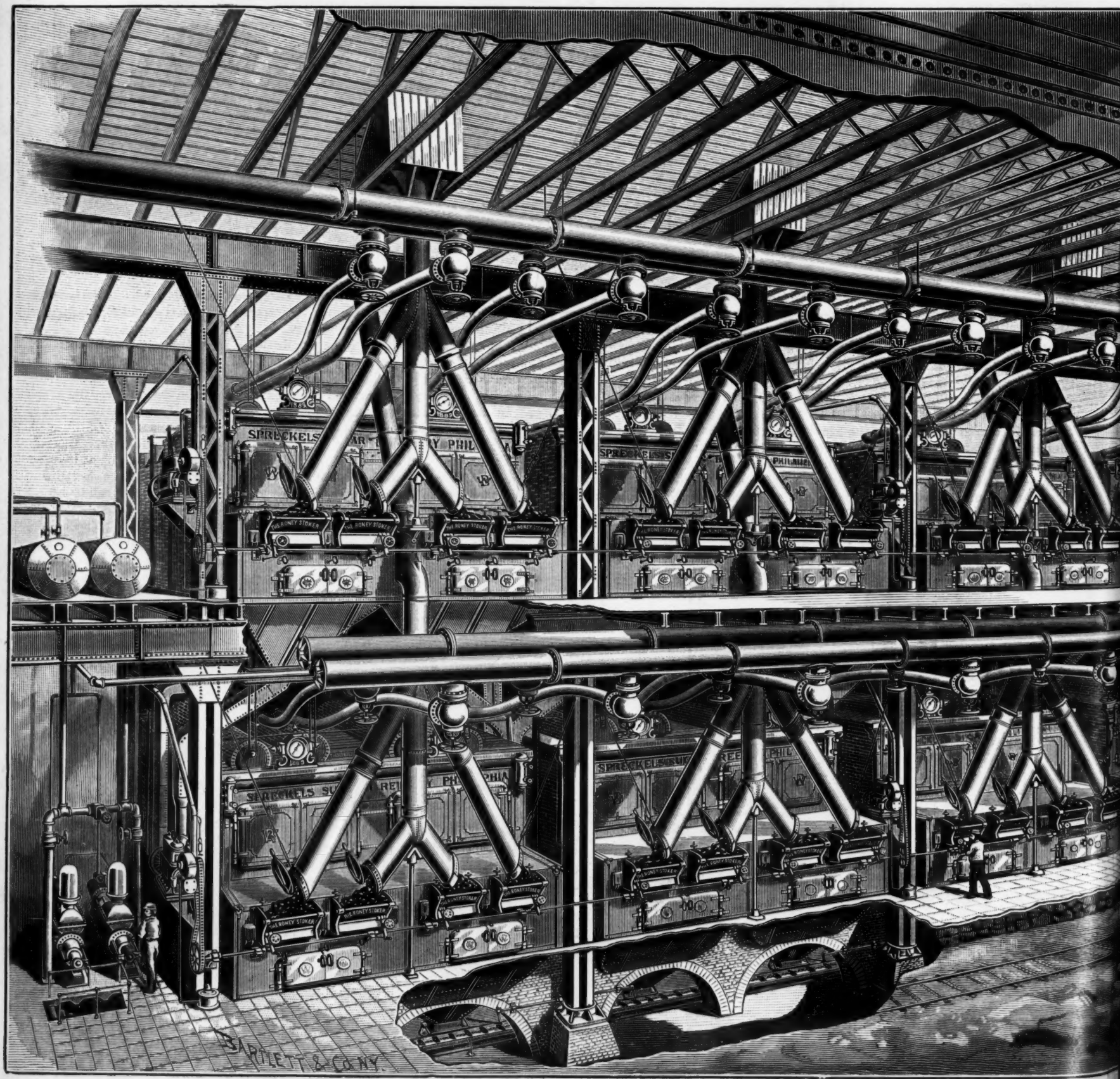
Aluminum for Improving Steel.

Sir Frederick Abel described the experiments of Keep, Riley (James), Hadfield, Stead and others, as to the use of aluminum in the production of steel castings. Some difference of opinion exists as to the value of the metal for improving the quality of steel. Sir Frederick Abel says: "The influence of aluminum, when used in small proportion, upon the properties of gray and white cast iron, is also of considerable interest, especially its effect in promoting the production of sound castings, and of modifying the character of white iron in a similar manner to silicon, causing the carbon to be separated in the graphitic form. The probable beneficial connection of aluminum with the industries of iron and steel, naturally directs attention to the great practical importance, in the same direction, which has lately been acquired by certain other metals, which, for long periods succeeding their discovery, have either been only of purely scientific interest and importance or have acquired practical value in regard to their positions in a few directions quite unconnected with metallurgy. Thus, great interest attaches to the influence of the metals manganese, chromium, and tungsten upon the physical properties of steel and iron."—[Iron and Steel Trades Journal, London, September 6.

Securing Iron into Stone.

A new cement for securing iron into stone is described in some of the foreign papers. The cement is made by melting resin and stirring in brick dust, which must be finely ground and sifted, until a sort of putty is formed, which, however, runs easily while hot. In using, the iron is set into the hole in the stone prepared to receive it, and the melted putty poured in until the space is filled; then, if desired, bits of brick, previously warmed, may be pushed into the mass, and a little of the cement thereby saved. As soon as the whole is cool the iron will be firmly held to the stone, and the cement is quite durable and uninjured by the weather, while, unlike lead and sulphur, it has no injurious effect upon the iron.

The Oswego, a steel steamship running between Buffalo and Chicago, recently made a trip between these two cities, a distance of 889 miles, in 54 hours and 16 minutes, being at the rate of 16½ miles an hour, thus showing the great revolution now taking place in the character of the lake marine.



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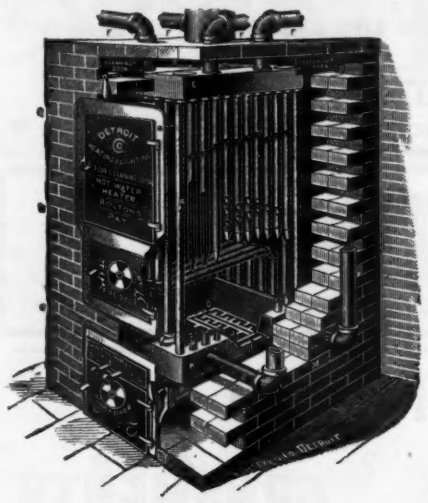

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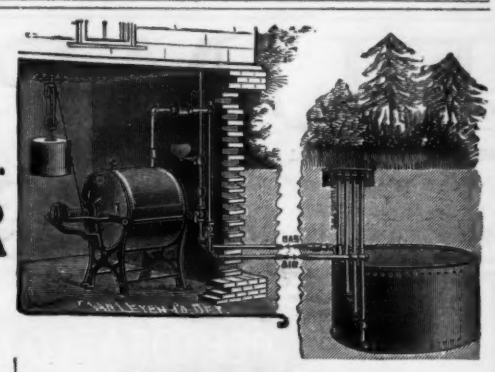

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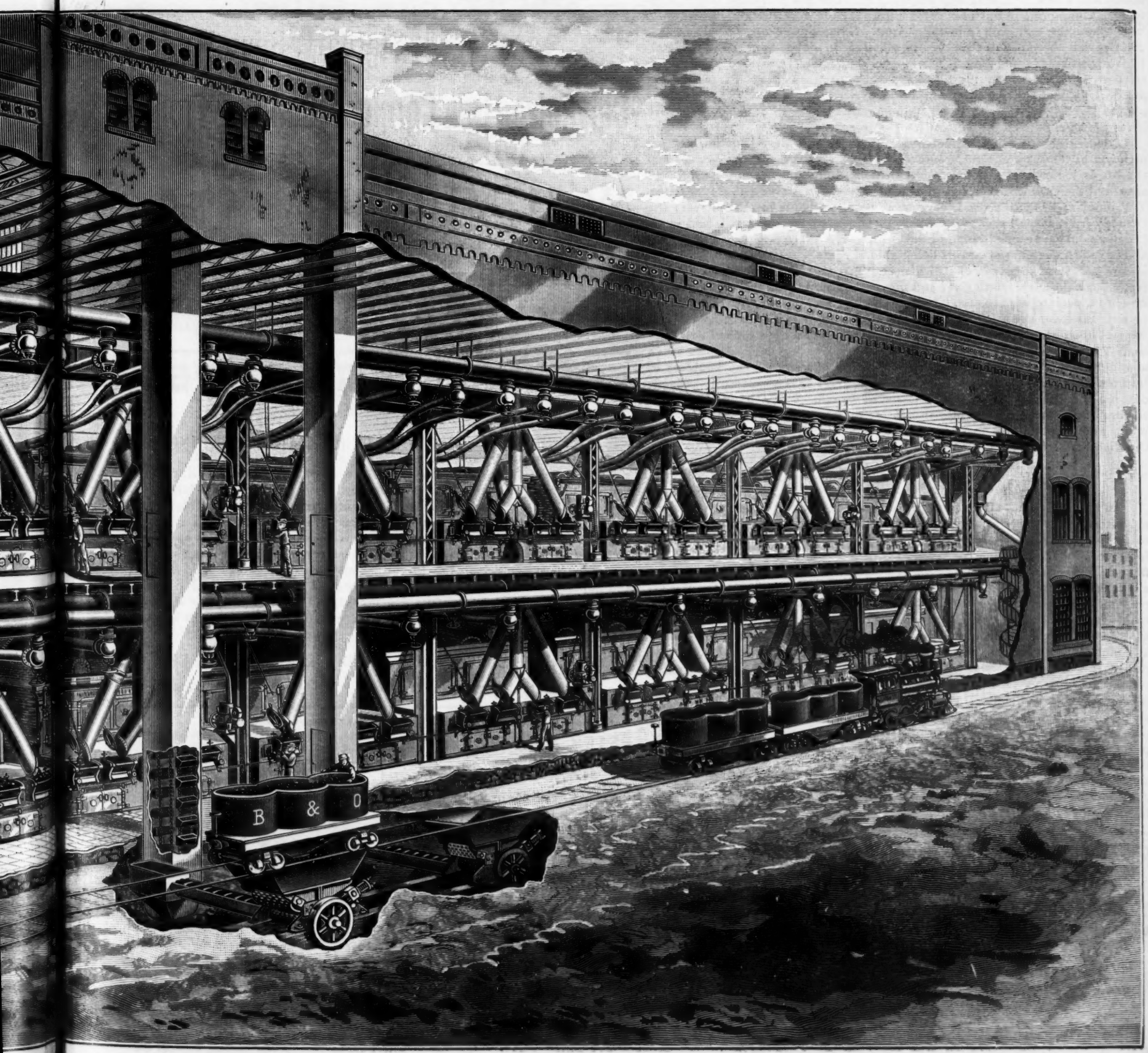

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SOUTH AMERICAN BESSEMER IRON ORES.

We have recently received specimens of iron ore from a deposit in the valley of the Orinoco River, South America, owned by George Turnbull, of New York City. The mines were opened about two years ago, and the shipments to the United States since that time have amounted to about 2,000 tons. It is stated that a lack of mining and shipping facilities has prevented larger shipments. The sample in our possession shows the ore to of a large-grained specular character, and rich in metallic iron. Numerous analyses made in this country and abroad show that the ore contains from 65 to 69 per cent. of metallic iron; silica, ranging from 1.76 to 8.58 per cent.; lime, from .12 to .75 per cent.; sulphur, from a trace to .181 per cent.; and phosphorus, from a trace to .045 per cent. The majority of the samples analyzed show the percentage of phosphorus to have been less than three one-hundredth of one per cent. The ore is readily smelted, and is practically self-fluxing.

Concerning the extent and charcter of the deposit Mr. S. Norton, furnace manager of the Troy Steel & Iron Co., who has visited the mines, states that the ore is located upon a spur of the Imataca mountains, 54 miles from the mouth of the Orinoco river, and is reached by vessels drawing 18 feet of water. The point at which the ore is at present being mined is two miles from the Orinoco river, a small arm of same passing around and forming an island called Corisimo. This arm or branch of the Orinoco has an average width of 350 feet and is 30 feet deep, large vessels being able to come within 50 feet of the shore at any point and some places still nearer. The ore is 1,600 feet from and 200 feet above the river, both river and mountain running in the same general direction, namely, west to east. Boulders of iron ore weighing from 100 pounds to 100 tons cover the top of the hills for a distance of 3,000 feet in length and 100 feet in width, there being in sight from 150,000 to 200,000 tons of Bessemer ore. The true vein shows an average thickness of 12 feet, and samples taken at widely separated points show an unchanging character. The boulders of iron ore are to be found at points 6, 32, and 35 miles to the westward. A large outcrop of ore is also to be seen on Corisimo Island. Being so near the water the ore can be loaded direct into ships at a minimum cost by means of an automatic gravity plane, the loaded cars returning the empty ones.—[Bulletin of the American Iron and Steel Association.

New Way to Secure Manufactures.

An idea which has taken form in Hartford, Conn., may be worth the consideration of the many towns throughout the West and South that are endeavoring to attract manufactures. In the city mentioned a company has been formed under the title Board of Trade Room & Power Co., prominent and influential citizens taking an active part in the matter, and they have purchased a tract of land on which they propose to erect a building suitable for the accommodation of a number of small enterprises. According to the announcement made, the building is to be first-class in every particular, equipped with a power plant and tools, and will be divided into as many rooms as may seem advisable. The idea is to rent these rooms to inventors or mechanics who may have undeveloped ideas relating to machinery, at low rates, and to give them such other assistance as may seem advisable in a mechanical way. Such ideas as seem to be good will then be considered by the Board of Trade, and such action taken as may be deemed advisable to place the enterprise on a proper financial fotting. Local publications state that the enterprise is being pushed by citizens, whose reputations guarantee success. It is aurgued that the establishment of a number of small industries will do more for the town than the securing of a few greater concerns. The plan as outlined has attracted considerable attention, and its results will be closely watched.—[American Manufacturer.

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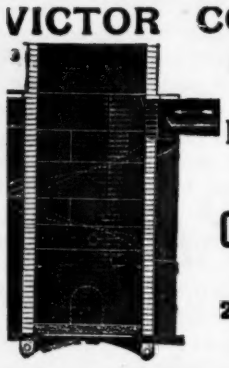

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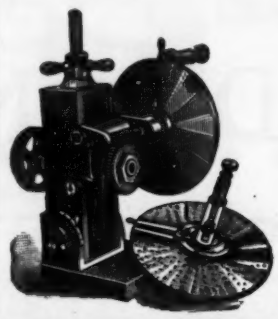

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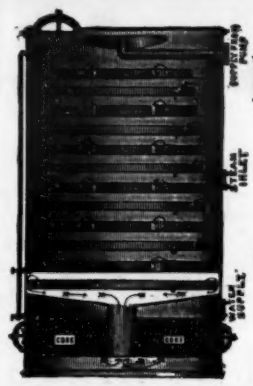

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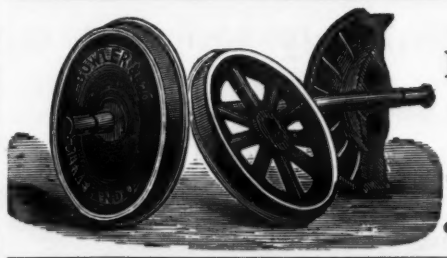

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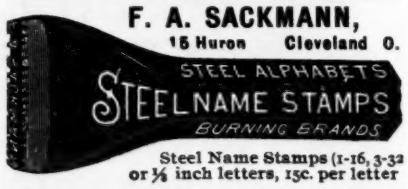

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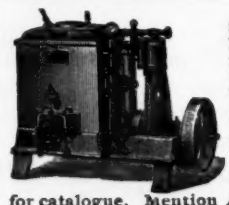

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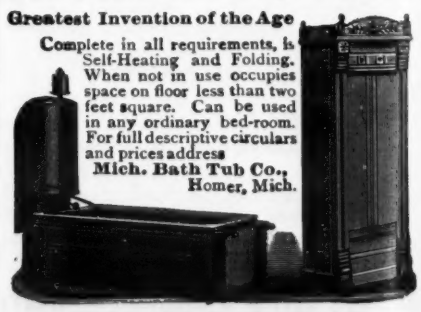

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½ to ¾ inch	3 25
⅞	3 45
1	4 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 15
1 to 1¾ by ¼ and 5-16 inch	2 25
½ to ⅝ by ¼ and 5-16 inch	2 45
⅝ to ⅞ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1⅛, Nos. 13 to 15	2 95
15-16, 1 and 1⅛, Nos. 16 to 18	3 05
15-16, 1 and 1⅛, Nos. 19 and 20	3 15
15-16, 1 and 1⅛, No. 21	3 25
15-16, 1 and 1⅛, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 35
1¼ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ⅛ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅜ and 13-16 by ⅛ to 3-16 in	2 85
⅜ and 13-16 by Nos. 11 and 12	2 95
½ and 11-16 by ⅛ to 3-16 in	3 15
½ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ⅛ to 3-16 in.	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
¾ by ⅛ to 3-16 in	3 75
¾ by Nos. 11 and 12	3 85

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 95
⅜ inch, " " " 13 and 14	3 15
¼ inch, " " " 11 and 12	3 25
¼ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3¼ to 4 in	11
⅜ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅜ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
Spring	"	3 50
Sleigh Shoe	"	3 00
Toe Calk	"	3 25
Cutter Shoes, tapered and burr.	"	3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

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	Net Tons
No. 1 R. R. wrought scrap	$19 50
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	13 50
Iron axles	22 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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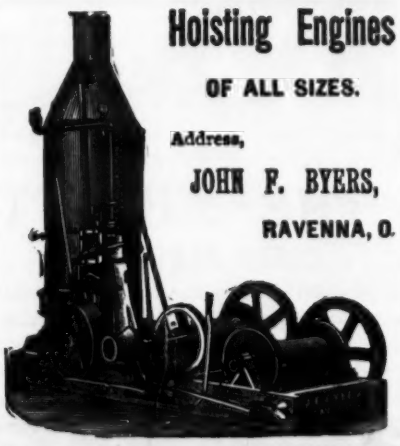

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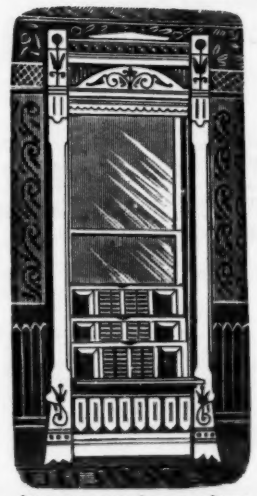

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Blacksmiths' { Hill's.....dis 40 / Bullock's.... dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard .dis 60&10
Shultz Raw Hide Leather Belting, single, ...dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2¾c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@5 &5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches ¼ 5-16 ⅜ ½ ⅝ ¾ 1
Square..... 8 7 5½ 4½ 4 3½ 3⅛
Hexagon 13½ 11½ 8½ 6 5¼ 5¼ 5
Washers 9 8 7 5 4½ 4⅛ 4⅛
In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@32
Vegetable Rubber.....@ 40

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

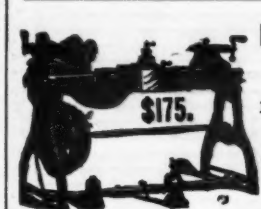
Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40



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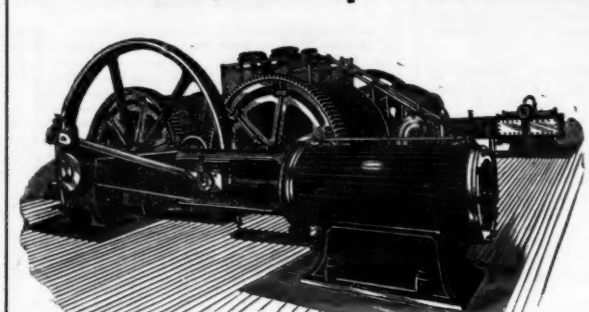

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Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

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Makers' and Special Brands—
First quality.....℔ doz $8 00
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Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Rnds.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

Eberts Bros., Detroit.	Per roll of 500 sq. feet.
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light.	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton.....$30 00
Asphaltum, Fine Grade, ℔ lb.....08
Coal Tar Felt, 1 Ply, ℔ lb.....02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....1.85
Roofing Pitch, ℔ gal.....09

Chains.

Revised List.

Trace, 6½-10-2.....℔ pair 1.03
Trace, 6½-10-3.....℔ pair .92 .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 5½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt.	$4 00	$4 50	$.....
Dairy, 14 qt.	4 50	5 00	.....
Fire 12 qt.	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt.	8 00	9 00	10 00

Basins, wash—

	Nos. 1	5.	5X.
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in.	.....	2 25	.....
Baskets, waste paper, 13 in.	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ lb.	23	24	25	26	28	dis 25&10
Putnam, ℔ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs. genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@[illegible]...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 50&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
[illegible] carpet tacks all kinds.....dis 70&10&10
[illegible] edes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10

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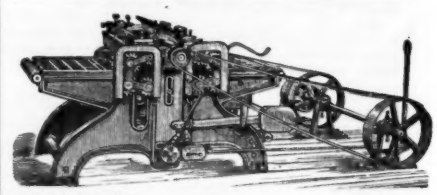

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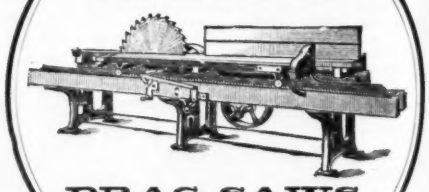

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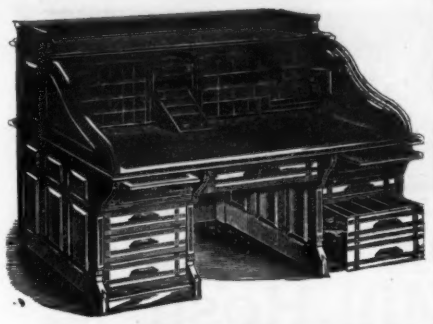

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—AND—

Bowerston, Pittsburgh, Marietta.

THROUGH COACHES

BETWEEN

Toledo & Marietta.

Through Sleepers Between

PITTSBURGH AND CHICAGO.

AND DAY COACHES BETWEEN

Toledo and Pittsburgh, Via Akron, Cuyhoga Falls, Kent, Ravenna, Leavittsburg, Warren, Niles, Girard, Youngstown, New Castle and Allegheny.

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LITHOGRAPH BUILDING CLEVELAND O.

TRAVELERS' REGISTER.

Standard Time.

Erie Railway.

Depot, South Water Street and Viaduct.

	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express*	10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	‡1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

d Daily. Other trains except Sunday.

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Cleveland & Marietta Ry.

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	Depart.
No. 62, Accommodation.....	† 6 05 a m
No. 72, New York & Pitts. Express....	* 8 10 a m
No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitsburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

*Daily. †Daily, except Sunday.

Baggage checked through to all points East.

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L. P. FARMER, Gen. Pass. Agt., New York
W. C. RINEARSON, Ass't G. P. A., Cleveland, O.
M. L. FOUTS, City Pass. and Ticket Agt., 141 Superior st., Weddell House, Cleveland, O.

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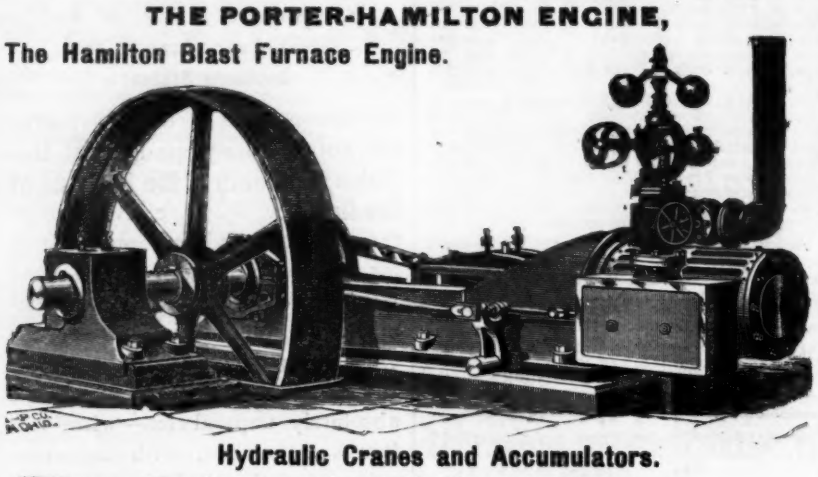

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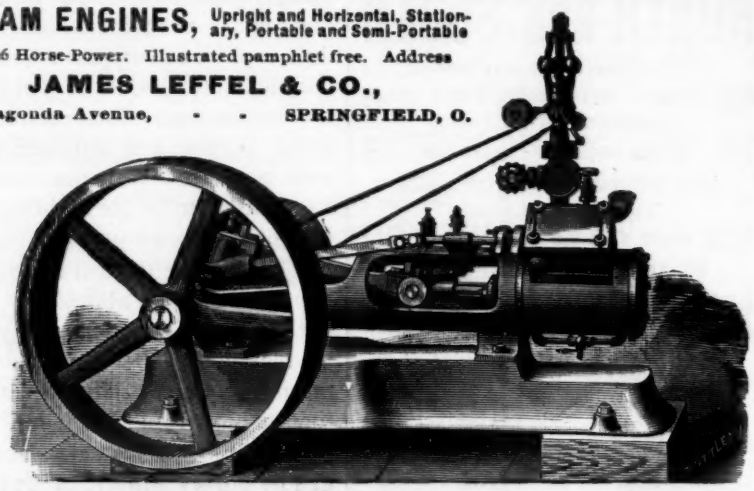

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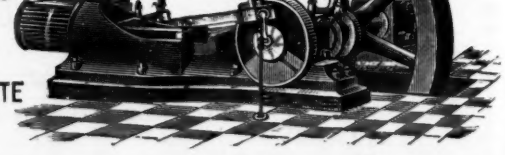

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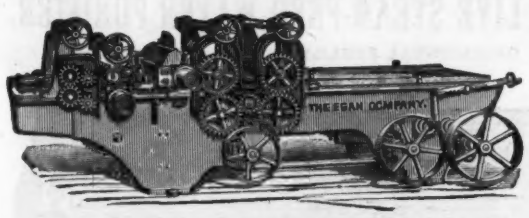

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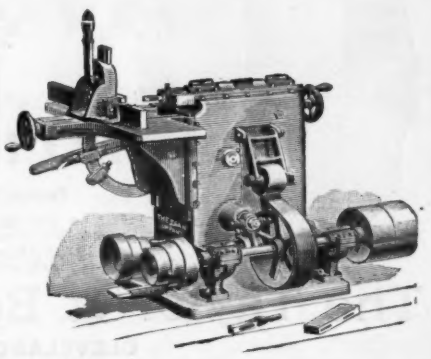

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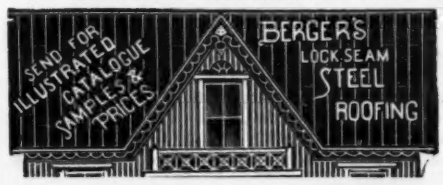

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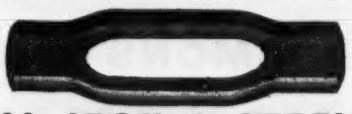

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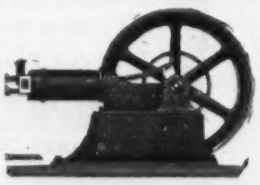

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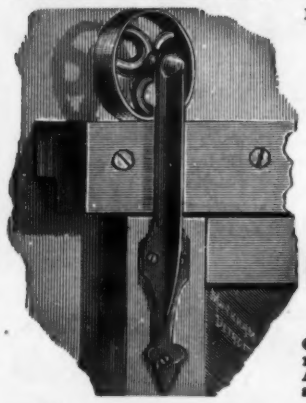

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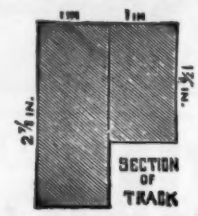

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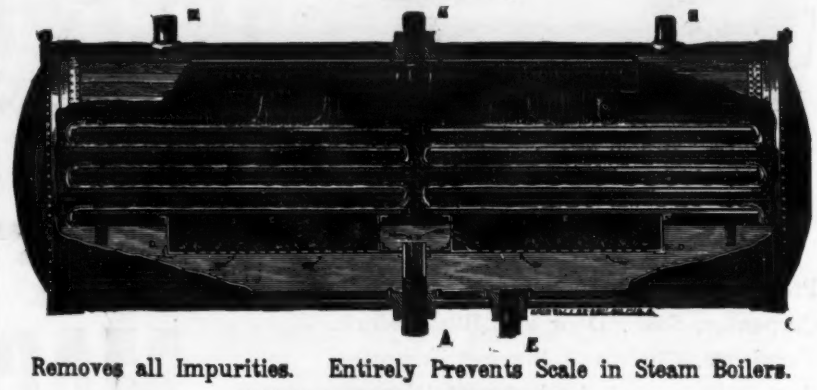

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